

**ENVIRONMENTAL ASSESSMENT FOR AN INTERIM RULE TO REDUCE
RECREATIONAL RED GROUPER HARVEST IN THE GULF OF MEXICO, WITH
ASSOCIATED IMPACTS ON GAG AND OTHER GROUPERS**



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Abbreviations Used in This Document

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| ABC | Allowable (or Acceptable) Biological Catch |
| APA | Administrative Procedures Act |
| CEQ | Council on Environmental Quality |
| CMP | Coastal Migratory Pelagic |
| Council | Gulf of Mexico Fishery Management Council |
| CZMA | Coastal Zone Management Act |
| EA | Environmental Assessment |
| EEZ | Exclusive Economic Zone |
| EIS | Environmental Impact Statement |
| ESA | Endangered Species Act |
| FMP | Fishery Management Plan |
| FONSI | Finding of No Significant Impacts |
| GMFMC | Gulf of Mexico Fishery Management Council |
| GOM | Gulf of Mexico |
| GW | Gutted Weight |
| MMPA | Marine Mammal Protection Act |
| mp | million pounds |
| MSFCMA | Magnuson-Stevens Fishery Conservation and Management Act |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| PRA | Paperwork Reduction Act |
| Secretary | Secretary of Commerce |
| SEFSC | Southeast Fisheries Science Center |
| SERO | Southeast Regional Office (NMFS) |

Environmental Assessment (EA) Cover Sheet

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Name of Action

Interim Rule to Reduce the Recreational Harvest of Gulf of Mexico Red Grouper

Type of Action

Administrative
 Draft

Legislative
 Final

Summary

Secretarial Amendment 1 to the Reef Fish Fishery Management Plan of the Gulf of Mexico was implemented by NOAA's National Marine Fisheries Service (NMFS) on July 15, 2004, and established a rebuilding plan and 6.56 million pound (mp), gutted weight (GW), allowable biological catch for red grouper, and reduced the quotas for deep-water and shallow-water groupers. During 2003 and 2004, recreational red grouper landings exceeded the 1.25 mp GW recreational target catch level. Without additional regulations, the Gulf of Mexico Fishery Management Council (Council) expects recreational red grouper landings in 2005 to continue to exceed the recreational target catch level. In March, the Council requested NMFS implement an interim rule to reduce the 2005 recreational red grouper harvest. This environmental assessment evaluates the effects of changes to the red grouper and aggregate grouper bag limit, increases to the red grouper size limit, and the effects of various seasonal closures for all groupers. The purpose of this action is to establish interim regulations that reduce the likelihood overfishing for red grouper will occur in 2005. Other objectives include preventing or minimizing biological impacts on gag and other groupers resulting from shifts in effort due to red grouper management actions and minimizing, to the extent practicable, social and economic impacts resulting from interim regulations.

Fishery Impact Statement – Social Impact Analysis

Regulations impose restrictions on fishery participants, which can result in adverse effects on fishermen and fishing communities. This EA evaluates the effects of changes to the red grouper and aggregate grouper bag limit, increases to the red grouper size limit, and various seasonal closures for all groupers. These restrictions are intended to reduce harvest overages that have occurred in the previous two fishing seasons, return the fishery to landings levels specified in the rebuilding plan, and avoid the more severe adverse socio-economic effects of continued overages and deviation from the rebuilding plan.

Status quo management of the red grouper fishery would maintain existing regulations and likely lead to continued recreational harvest overages. Status quo management of the aggregate grouper fishery, in conjunction with more restrictive management of red grouper, may result in excessive stress to other grouper species as a result of redirected effort. Both scenarios would require more restrictive management in the future; inducing foregone benefits and greater adverse socioeconomic impacts than would accrue to management attention at this time.

Action 1 considers reducing the red grouper recreational bag limit, establishing a seasonal closure for the entire grouper fishery, increasing the red grouper minimum size limit, and various combinations of each of these alternatives. Action 2 considers reducing the aggregate grouper recreational bag limit. All alternatives under both actions would result in short term reductions in consumer surplus and may result in trip cancellation and reduction in expenditures to the directed sectors and associated industries and communities. All losses, however, are expected to be less than those that would occur in the longer term as a result of delay in returning the fishery to the necessary harvest conditions. Among the alternatives under Action 1, Alternative 2 (one fish bag limit) would produce the lowest short-term adverse impacts, but would result in insufficient progress towards returning the fishery to required conditions. Alternative 4 (July-December closure) would result in the greatest short-term losses, and result in harvest reductions greater than necessary. Among the alternatives that appear to satisfy the necessary harvest reductions, Alternatives 3 (one fish bag limit and various closed seasons) and 5 (22 or 23 inch size limit), the biological savings implied under Alternative 5 may be overstated since they may not adequately account for the biological harm created by the additional release mortality likely to ensue. Among the seasonal closure options under Alternative 3, the November-December closure in Preferred Alternative 3c is projected to result in the least adverse short-term socioeconomic impacts. This alternative is projected to result in a short-term reduction in consumer surplus of approximately \$235,000 to \$432,000 and potential reduced expenditures of approximately \$12 million. Again, however, these impacts are expected to be less than those that would accrue to continued harvest overages.

Among the aggregate grouper bag limit alternatives for Action 2, the harvest protection of Alternative 2 (4-fish aggregate) is believed to be insufficient, whereas that of Alternative 4 (2-fish aggregate) is excessive. The adverse short-term socioeconomic impacts of Preferred Alternative 3 (3 fish aggregate), in combination with the preferred seasonal closure option under Action 1 (Alternative 3c), are the lowest of the seasonal closure combinations for this alternative. Preferred Alternative 3, in combination with a November-December closure, is projected to result in a short-term reduction in consumer surplus of approximately \$265,000 to \$535,000 and

potential reduced expenditures of approximately \$12 million. These impacts are expected to be less than those that would accrue from continued harvest overages.

A more detailed analysis of the impacts on fishery participants and their communities is found in Section 4.0 and Section 5.0 herein.

1.0 INTRODUCTION

1.1 Background

In October 2000, the red grouper stock was declared by NMFS to be overfished and undergoing overfishing based on the results of a 1999 stock assessment. In 2002, another stock assessment was conducted and determined the red grouper stock was in an improved condition and no longer overfished, although not rebuilt to a biomass-level capable of producing MSY. On July 15, 2004, NMFS implemented Secretarial Amendment 1 to the Reef Fish Fishery Management Plan (FMP). The purpose of this amendment was to reduce overfishing of red grouper and rebuild the stock to Bmsy. The amendment established a commercial quota, a two-fish recreational bag limit, and a 10-year rebuilding plan for red grouper. The amendment also reduced the commercial quotas for both shallow- and deep-water grouper, and established biological reference points and status determination criteria for red grouper.

The red grouper rebuilding plan is based on a stepped rebuilding strategy. During the first three-year interval (2003-2005) of the red grouper rebuilding plan, the allowable biological catch (ABC) is 6.56 mp GW. The commercial fishery accounts for 81 percent of the ABC (5.31 mp) and the recreational fishery accounts for 19 percent of the ABC. In both 2003 and 2004, recreational red grouper landings exceeded the 1.25 mp GW target catch level, while commercial landings were less than the 5.31 mp GW commercial quota. Recreational landings in 2003 were only slightly greater than the target catch level and totaled 1.35 mp GW. In 2004, recreational landings totaled 3.10 mp GW. The commercial fishery landed 4.94 mp GW (6.9 percent less than the commercial quota) of red grouper in 2003 and 5.24 mp GW (1.1 percent less than the commercial quota) of red grouper in 2004. NMFS closed the commercial grouper fishery on November 15, 2004, to prevent the commercial quota from being exceeded and implemented trip limits via an emergency rule in 2005 to extend the length of the 2005 fishing season.

During the March 7-10, 2005, Council meeting in Birmingham, Alabama, the Council reviewed red grouper landings and passed a motion requesting NMFS implement an interim rule to reduce the 2005 recreational red grouper catch. A March 16, 2005, letter to the Regional Administrator from the Council requested NMFS expedite the interim rule as quickly as possible so that it will take effect in July 2005, or as soon as possible thereafter.

1.2 Authority to Promulgate Interim Regulations

The Council may request the Secretary of Commerce (Secretary) implement interim measures to reduce overfishing until such measures can be replaced by measures proposed in a fishery management plan, a plan amendment, or regulations (Sec. 304(e)(6) and Sec. 305(c), Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA)). The Secretary may promulgate the interim measures to address an emergency (e.g., overfishing) if the Council, by less than a unanimous vote, requests such an action (Sec. 305(c)(2)(B), MSFCMA). Any interim regulation that changes an existing fishery management plan or amendment must be published in the *Federal Register* and shall remain in effect for not more than 180 days, unless extended by one additional period of no more than 180 days (Sec. 305(c)(3)(A and B), MSFCMA). The Secretary may terminate an interim regulation at an earlier date if the Council requested the

action and the Council agrees with the Secretary to terminate the emergency action prior to the end of the 180-day period (Sec. 305(c)(3)(D), MSFCMA).

1.3 Purpose and Need for Action

Without additional regulations, the Council expects recreational red grouper landings in 2005 to continue to exceed the 1.25 mp GW recreational target catch level. The Council intends to consider permanent adjustments to recreational management measures as part of a regulatory amendment in late 2005 and is not planning to increase ABC during the 2006 fishing season. However, action is needed in the interim to reduce recreational red grouper landings in 2005. Based on landings during 2003 and 2004, it is estimated that as much as a 43 percent reduction in recreational red grouper landings (12-13 percent reduction in total landings) is needed to end overfishing in 2005. Lesser or greater reductions in landings could be needed depending on actual 2005 red grouper landings, which are currently unknown. Preliminary 2005 landings data (Marine Recreational Fisheries Statistics Survey (MRFSS) waves 1 and 2) indicate recreational red grouper landings are less than 2004 landings, but are still likely to be well above the 1.25 mp target catch level.

The purpose of this action is to establish interim regulations that reduce the likelihood that overfishing for red grouper will occur in 2005. Additional objectives of this action include: 1) preventing or minimizing biological impacts on gag and other groupers resulting from shifts in recreational effort due to red grouper management actions and 2) minimizing or reducing social and economic impacts resulting from interim regulations, while still achieving biological objectives.

2.0 MANAGEMENT ALTERNATIVES

Section 1502.14 of the Council on Environmental Quality (CEQ) regulations requires agencies to explore and objectively evaluate all reasonable alternatives for an action, including the no action alternative. The analysis of alternatives shall describe the environment to be affected by the action (see Section 3.0) and the environmental consequences of each of the alternatives (see Section 4.0) (Part 1502.14, CEQ). Alternatives shall be presented in comparative form to provide a clear basis for why decision makers selected the preferred alternative(s).

The following is a brief description of each of the actions and alternatives considered in this EA. A more detailed description of the environmental consequences associated with each alternative can be found in Section 4.0. Section 3.0 describes the physical, biological, social, economic and administrative environments affected by this action. Section 5.0 provides a detailed discussion of the economic impacts of this action.

ACTION 1: Red Grouper Management Measures

Alternative 1: No action (status quo): The recreational bag limit for red grouper is two fish and the minimum red grouper size limit is 20 inches total length (TL) (6.0 percent reduction resulting from recent implementation of two fish bag limit)

Alternative 2: Reduce the recreational red grouper bag limit from 2 to 1 fish (14.8 percent reduction)

Alternative 3: Reduce the recreational red grouper bag limit from 2 to 1 fish and establish a closed season for all groupers during:

- a) October – December (27.2 percent reduction in red grouper harvest; 26.6 percent reduction in harvest of other groupers)
- b) September – December (32.8 percent reduction in red grouper harvest; 35.2 percent reduction in harvest of other groupers)

Preferred --> c) November – December (21.5 percent reduction in red grouper harvest; 17.8 percent reduction in harvest of other groupers)

- d) August – November (42.1 percent reduction in red grouper harvest; 34.4 percent reduction in harvest of other groupers)

Alternative 4: Establish a six-month closed season (July – December) for the recreational harvest of grouper (55.2 percent reduction in red grouper harvest; 51.3 percent reduction in harvest of other groupers)

Alternative 5: Increase the recreational red grouper minimum size limit from 20 inches TL to:

- a) 22 inches TL (22.0 percent reduction in red grouper harvest)
- b) 23 inches TL (30.0 percent reduction in red grouper harvest)

Discussion: **Alternative 1** would continue to allow recreational anglers to harvest two red grouper and would maintain the 20-inch TL minimum size limit. Continued fishing under status quo regulations is expected to result in red grouper harvest exceeding the recreational target catch level of 1.25 mp GW. No additional restrictions would be implemented to reduce either red grouper harvest or the harvest of other shallow- and deep-water grouper. Continued overages would jeopardize the recovery of red grouper, requiring deviation from the rebuilding plan, more restrictive management measures, and delay in greater harvest allowances that would be possible as the stock is rebuilt. Maintaining existing regulations would not change bycatch in the short-term because **Alternative 1** does not change the methods or gears used for harvest. Currently, greater than 85 percent of all recreationally caught red grouper are released and it is estimated 44 percent of all recreationally caught red grouper (landed fish + dead discards) dying each year die from release mortality (Strelcheck 2005b).

Reductions in harvest would only result from the recently implemented two-fish bag limit and non-regulatory actions, such as reductions in fishing effort and catch rates. Based on updated landings and intercept data since implementation of Secretarial Amendment 1, it is estimated the two red grouper bag limit will reduce red grouper harvest by approximately 6 percent in 2005 (Table 1). **Alternative 1** is expected to reduce recreational red grouper harvests by approximately 9,200-16,000 fish, valued at \$38,000-\$69,000 in consumer surplus. An estimated 483-3,721 trips would be impacted by this alternative. **Alternative 1** has the lowest likelihood of eliminating or reducing the likelihood of recreational overages in 2005. The effects of this alternative will have the least short-term economic effects and biological effects are not expected to be significant because the recreational fishery represents a small portion of the overall red grouper harvest.

Alternative 2 would maintain the 20-inch TL minimum size limit and reduce the red grouper bag limit from two to one red grouper per angler. Reducing the red grouper bag limit to one is estimated to reduce recreational red grouper harvest by 14.8 percent during 2005. This measure could result in increased fishing pressure and fishing mortality on other groupers if anglers replace the one red grouper they were previously allowed to keep with another grouper. Because red grouper co-occur with other grouper species, this alternative would also increase red grouper bycatch if anglers continue fishing for other groupers once reaching their red grouper bag limit. It is estimated that 44 percent of red grouper caught annually by recreational anglers die from release mortality (Strelcheck 2005b). **Alternative 2** has a higher likelihood of eliminating or reducing red grouper overfishing than **Alternative 1**, but a lower likelihood than **Alternatives 3-5**. Overall, a 15 percent reduction is not likely to achieve a great enough reduction in recreational harvest to eliminate or greatly reduce the likelihood of recreational overages in 2005.

Alternative 2 is expected to reduce recreational red grouper harvests by approximately 21,000-43,000 fish, valued at \$86,000-\$117,000 in consumer surplus. This alternative would reduce the value of fish harvested by \$48,000 - \$108,000 more than **Alternative 1** (Table 12). The reduced red grouper bag limit is expected to affect 7,000-8,000 more trips than **Alternative 1**. Thus, the short-term adverse economic impacts of **Alternative 2** would be greater than those of **Alternative 1**. The increased harvest savings, however, should reduce the jeopardy to the red grouper rebuilding plan, thereby reducing the severity of more restrictive management and delayed rebuilding that may be required, and reduce the accompanying adverse economic impacts.

Alternative 3 would maintain the 20-inch TL minimum size limit, would reduce the red grouper bag limit from two to one red grouper per angler and establish a two (**Preferred Alternative 3c**), three (**Alternative 3a**), or four month closed season for all groupers (**Alternative 3b** and **3d**) during late summer or fall 2005. Depending on the months closed, this alternative would reduce red grouper harvest by 22 to 42 percent and reduce the harvest of other grouper, primarily gag, by 18 to 35 percent in 2005 (Tables 2 and 3). Because red grouper are part of a multispecies fishery, prohibiting the harvest of all groupers would reduce discard mortality during closure months and prevent effort from shifting to other grouper if only the red grouper fishery were closed. Closures for all grouper would have positive biological benefits on gag and other groupers by reducing harvest and fishing mortality for these species. Non-grouper reef fishes, such as red snapper, could be negatively affected by a closure if anglers target these species when the grouper fishery is closed. However, if **Preferred Alternative 3c** is implemented, the recreational red snapper fishery would not be affected by effort shifting because the fishery is closed during November and December. The likelihood of eliminating or reducing recreational overages would be greatest for **Alternative 3d**, followed by **Alternative 3b, 3a**, and **3c** respectively.

Alternative 3 is expected to reduce harvests by approximately 57,000-259,000 fish, valued at \$235,000-\$1.025 million in consumer surplus. These results are approximately \$197,000-\$957,000 more than **Alternative 1**. Closed seasons considered in **Alternative 3** are expected to affect 78,000-374,000 more trips than **Alternative 1**. Among the closure alternatives, **Preferred**

Alternative 3c is expected to produce the least short-term impacts on consumer surplus and expenditures.

Since **Alternative 3** includes more restrictive management measures than **Alternatives 1** or **2**, the beneficial biological impacts of **Alternatives 3a-d** exceed those of **Alternatives 1 and 2**. The increased harvest savings attributed to the closure, however, should further reduce the jeopardy to the red grouper rebuilding plan, thereby reducing the adverse impacts of more restrictive management and delayed rebuilding, and increasing benefits from an improved stock condition. **Alternative 3** also would likely result in less discard mortality when compared to **Alternative 5**, which proposes increasing the minimum size limit. **Alternative 3** also provides added protection to other grouper species, if effort shifts because of red grouper management actions.

Alternative 4 would establish a six-month closed season for all groupers from July 1 to December 31, 2005. It is estimated this alternative would reduce red grouper harvest by 55 percent and reduce the harvest of other grouper by 51 percent. Similar to **Alternatives 3a-d**, this alternative is expected to reduce discard mortality of groupers. Implementing a closed season for all groupers would also reduce grouper fishing mortality and provide added protection to the gag fishery, which is currently fully utilized. **Alternative 4** is the most restrictive alternative being considered and would likely constrain the harvest below the recreational target catch level in 2005.

Alternative 4 is expected to reduce harvests by approximately 180,000-312,000 fish, valued at \$686,000-\$1.235 million in consumer surplus. These results are approximately \$648,000-\$1.166 million more than **Alternative 1**. The closed season is expected to affect 438,000-481,000 more trips than **Alternative 1**. Potential foregone expenditures under **Alternative 4** are, on average, six times greater than those under **Preferred Alternative 3c** (Table 22). The adverse economic impacts of **Alternative 4** are the greatest, on average of all the alternatives considered.

Alternative 5 would increase the minimum size limit for red grouper from 20 inches TL to either 22 inches TL (**Alternative 5a**) or 23 inches TL (**Alternative 5b**). It is estimated **Alternatives 5a** and **5b** would reduce 2005 red grouper harvest by 22 and 30 percent, respectively.

Alternative 5a has a greater likelihood of eliminating overfishing than **Alternatives 1, 2** and **3c**, but a lower likelihood than **Alternative 3a-b, 3d, 4**, and **5b**. **Alternative 5b** represents an intermediate reduction in harvest and would have a higher likelihood of eliminating recreational overages than **Alternative 5a**. Both of these alternatives would increase release mortality and may result in lost yield. Higher size limits would contribute to more red grouper being released and dying when compared to status quo. The proposed size limits could also result in forgone yield, because more fish would die from natural and release mortality before being harvested.

Alternative 5a is projected to result in a reduction in red grouper harvests of approximately 92,000 fish, valued at \$292,000, whereas the comparable estimates for **Alternative 5b** are 121,000 fish and \$383,000 (Table 10). These values exceed those of **Alternative 1** by \$239,000 and \$330,000, respectively. The average estimated reduction in consumer surplus under **Alternative 5a** is less than the average reductions under **Preferred Alternative 3c** (\$292,000 compared to \$334,000), and the reduction in consumer surplus under **Alternative 5b** is less than

that of **Preferred Alternative 3c** under 2004 conditions (\$383,000 compared to \$432,000). However, the mortality associated with the release of undersized fish is likely to negate the benefits of the reduced harvests, thereby reducing the necessary progress toward returning to the rebuilding path and not avoiding more restrictive management and accompanying adverse economic impacts. Similar concern is not as great under bag and seasonal adjustments since there is a greater expectation that targeted fishing will cease upon reaching the bag limit, and directed fishing will be reduced under seasonal closures, thereby reducing catch and release activity. Increased minimum size limits, conversely, directly affect the ability to reach the bag limit, inducing increased catch and release behavior. Thus, the net adverse economic impacts of **Alternative 5** are expected to be greater than those of **Preferred Alternative 3c**.

Action 2: Aggregate Grouper Bag Limit

Alternative 1: No action (status quo): The aggregate grouper bag limit is 5 fish (0 percent reduction in harvest)

Alternative 2: Reduce the aggregate grouper bag limit from 5 to 4 fish (see Tables 4 and 5 for harvest reductions)

Preferred ---> Alternative 3: Reduce the aggregate grouper bag limit from 5 to 3 fish (see Tables 4 and 5 for harvest reductions)

Alternative 4: Reduce the aggregate grouper bag limit from 5 to 2 fish (see Tables 4 and 5 for harvest reductions)

Discussion: **Alternative 1** would maintain the aggregate bag limit of five grouper per angler. The grouper aggregate bag limit has been in effect since 1990 when Amendment 1 to the Reef Fish FMP was implemented. This alternative is not expected to reduce grouper harvest any more than what is estimated in alternatives for Action 1.

Alternatives 2-4 would reduce the aggregate grouper bag limit from 5 to 4, 3, or 2 grouper per angler, respectively. **Alternative 2** would reduce the harvest of grouper, excluding red grouper, by 1.8 percent in 2005 (Table 4). **Alternative 3** would reduce the harvest of grouper, excluding red grouper, by 5.2 percent in 2005 (Table 4). **Alternative 4** is the most restrictive aggregate bag limit and would reduce the harvest of grouper, excluding red grouper, by 12 percent in 2005 (Table 4). It is estimated that 5.5 percent of all MRFSS trips would be affected by **Alternative 2**, 6.4 percent would be affected by **Preferred Alternative 3**, and 8.7 percent would be affected by **Alternative 4**. Table 5 summarizes reductions in grouper harvest resulting from implementation of a lower aggregate bag limit combined with alternatives considered in **Alternatives 2 and 3a-d of Action 1**.

Reducing the aggregate bag limit may provide protection to other grouper species from redirected red grouper effort, as well as reduce bycatch and subsequent mortality of red grouper, assuming anglers cease fishing upon reaching the aggregate bag limit. The potential protection is greatest for **Alternative 4**, followed by **Alternatives 3, 2, and 1**. The greater the reduction, the more anglers are limited in substituting other grouper species for reductions in red grouper

harvests. Further, at some point, the protection of these other species may be greater than is necessary to sustain the stock over the long-term, given natural availability and the ability or tendency to catch these species. Thus, foregone socioeconomic benefits may be incurred. **Preferred Alternative 3** represents an intermediate aggregate bag limit that would provide additional protection for gag, and other groupers, resulting from potential effort shifting due to red grouper management actions. The biological benefits and socio-economic impacts of **Preferred Alternative 3** are slightly greater than **Alternatives 1 and 2**, but slightly less than **Alternative 4**.

3.0 AFFECTED ENVIRONMENT

Section 1502.15 of the CEQ regulations states “environmental impact statements shall succinctly describe the area(s) to be affected or created by the alternatives under consideration.” A brief description of the affected environment is included herein. More detailed descriptions of the affected environment can be found in the draft EIS to the Generic EFH Amendment (GMFMC 2004a) and Secretarial Amendment 1 to the Reef Fish FMP (NOAA Fisheries 2004a), and are incorporated herein by reference.

3.1 Physical Environment

The grouper fishery occurs throughout the Gulf of Mexico, but is primarily concentrated on the west Florida shelf. Most recreational landings of red grouper and other shallow-water grouper occur off of Florida over hard-bottom habitat (see Section 3.2.1.1). In the western Gulf of Mexico (GOM), deep-water grouper are harvested over rocky ridges or flat bottom, near banks or ‘lumps’ (Cass-Calay and Bahnick 2002). Deep-water grouper also occur near the shelf-edge over sand, mud and shell bottom (Cass-Calay and Bahnick 2002).

The GOM is bounded by Cuba, Mexico, and the United States, and has a total area of 564,000 km². Continental shelves occupy about 35 percent of the total GOM. The west Florida shelf provides a large area of hard bottom habitat (Figure 1). It is comprised of low relief hard bottoms that are relict reefs or erosional structures. Some high relief can be found along the shelf edge in waters 130 to 300 m deep. Hard bottom provides extensive areas where reef biota such as corals can become established. These hard bottom areas have become important reef fish fishing areas (e.g., Florida Middle Grounds, Tortugas).

Off the Alabama/Mississippi shelf and shelf break, irregular-shaped aggregates of calcareous organic forms called pinnacles are found. These pinnacles average about 9 m in height and are found in waters about 80 to 130 m deep. In addition to the pinnacles, low-relief hard bottom areas can be found in waters less than 40 m adjacent to Florida and Alabama.

The Louisiana/Texas shelf is dominated by muddy or sandy terrigenous sediments, but banks and reefs do occur on the shelf (Figure 2). Mid-shelf banks made of bare, bedded Tertiary limestones, sandstones, claystones, and siltstones are found from water depths of 80 m or less and have relief of 4 to 50 m (Rezak et al. 1985). Relict reefs made of carbonate are found from water depths of 14 to 40 m and have a relief of 1 to 22 m. The Flower Garden Banks National Marine Sanctuary is located about 150 km directly south of the Texas/Louisiana border. This

coral reef is perched atop two salt domes rising above the sea floor and ranges from 15 to 40 m deep.

3.2 Biological Environment

Shallow-water and deep-water grouper comprise a multispecies fishery in the Gulf of Mexico. The Reef Fish FMP includes 42 species of reef fish comprising six families: Balistidae (triggerfishes), Carangidae (jacks), Labridae (wrasses), Lutjanidae (snappers), Malacanthidae (tilefishes), and Serranidae (groupers). Seventeen grouper species are included in the Reef Fish FMP, of which 13 are managed, two are prohibited from harvest (Nassau and goliath grouper), and two species are not in the management unit (sand perch and dwarf sand perch). Shallow-water grouper in the management unit include: red grouper, black grouper, gag, yellowfin grouper, scamp, yellowmouth grouper, rock hind, and red hind. Deep-water grouper in the management unit include: yellowedge grouper, warsaw grouper, snowy grouper, speckled hind, and misty grouper. Red grouper, gag, and black grouper are the most commonly harvested shallow-water grouper species in both the commercial and recreational sectors. Approximately 98 percent of deep-water grouper landings are by commercial fishermen. Yellowedge grouper is the most commonly harvested deep-water grouper species.

3.2.1 Biology and Life History

Secretarial Amendment 1 (NOAA Fisheries 2004a) and Amendment 24 to the Reef Fish FMP provide (GMFMC 2004d) detailed descriptions of the biology and life history of reef fish, and are incorporated herein by reference.

3.2.1.1 Red Grouper

Red grouper are commonly caught from Panama City, Florida, to the Florida Keys along the inner to mid-continental shelf in depths ranging from 2 to over 120 m (Moe 1969). The species inhabits flat rock perforated with solution holes, caverns and crevices of limestone reef, and hard bottom areas (Moe 1969; Bullock and Smith 1991). Juveniles live in shallow-water nearshore reefs until reaching approximately 16 inches (40 cm), when they become sexually mature and move offshore (Moe 1969). Red grouper reach a maximum length and weight of 43 inches (110 cm TL) and 50.7 lbs. (23 kg) (Robins et al. 1986). Maximum age is 28 years and females are 50 percent mature by 5 years of age and 15-20 inches TL (40-50 cm TL) (Moe 1969; Collins et al. 2002). Red grouper are protogynous hermaphrodites, transitioning from females to males at older ages, and form harems for spawning (Dormeier and Colin 1997). Age and size at sexual transition is approximately 13 years and 31-35 inches TL (80-90 cm TL) (Collins et al. 2002). Peak spawning occurs from March through May (Collins et al. 2002). Over the last 25-30 years, there has been little change in the sex ratio of red grouper, likely because they do not aggregate (Coleman et al. 1996).

3.2.1.2 Gag

Gag are primarily caught on the west coast of Florida from Tampa Bay to the northern extent of the state (Schirripa and Goodyear 1994). Newly settled juveniles are estuarine dependent,

occurring in shallow seagrass beds during late spring and summer (Koenig and Coleman 1998; Strelcheck et al. 2003). At the onset of the first winter, juvenile gag migrate offshore, although some juvenile gag may remain in inshore waters during winter (Heinisch and Fable 1999). As gag mature, they move to deeper, offshore waters to spawn. Gag are protogynous hermaphrodites, transitioning from females to males at older ages. Age and size at sexual transition is approximately 11 years and 41 inches TL (105 cm TL). Maximum age is 26 years (Harris and Collins 2000) and females are 70 percent mature by 4 years of age and 25.6 inches TL (65 cm TL) (Hood and Schlieder 1992). They form spawning aggregations at depths ranging from 160-400 feet (49-122 m) (Coleman et al. 1996). Peak spawning occurs from February through March (Hood and Schlieder 1992). Often immature female gag are found with spawning aggregations (Coleman et al. 1996). Gag reach a maximum length and weight of 47 inches (120 cm) TL and 80 lbs. (23 kg) (Harris and Collins 2000; IGFA 2003).

3.2.1.3 Other Shallow-water Grouper

Other shallow-water groupers that occupy similar depth distributions and geographic ranges as red grouper and gag include black grouper, scamp, red hind, rock hind, yellowfin grouper, Nassau grouper, goliath grouper, and yellowmouth grouper. These species account for a small percentage of the overall recreational shallow-water grouper landings (~5-10 percent). Black grouper and scamp are the most commonly landed shallow-water grouper after gag and red grouper. Yellowfin grouper, yellowmouth grouper, rock hind, and red hind are infrequently landed by recreational anglers, and account for less than 1/10 of one percent of the annual recreational shallow-water grouper landings. The harvest of goliath and Nassau grouper is prohibited in the Gulf of Mexico.

Maximum lengths of these shallow-water grouper range from 35 inches TL (89 cm, scamp) to 98 inches TL (250 cm, goliath grouper), with most reaching a maximum length of slightly greater than 39 inches (1 m) (Matheson et al. 1986; Heemstra and Randall 1993). Rock hind, Nassau grouper, and speckled hind have shorter life spans than most groupers, with maximum ages ranging from 12 to 17 years (Matheson and Huntsman 1984; Claro et al. 1990; Potts and Manooch 1995). Maximum weights for these shallow-water grouper range from 13.6 lbs (6.2 kg) (yellowmouth grouper) to 680 pounds (308 kg) (goliath grouper) (Bullock and Murphy 1994; IGFA 2003). Black grouper are the largest shallow-water grouper species allowed for harvest, reaching a maximum length and weight of 89 inches TL (151 cm) and 180 lbs (82 kg) (Crabtree and Bullock 1998).

Most of the shallow-water grouper mature between 3 and 5 years, although Nassau and goliath grouper are known to mature as late as 7-8 years of age (Bullock et al. 1992; Sadovy and Colin 1995). Many, but not all shallow-water grouper are protogynous hermaphrodites and transition from females to males as they grow larger. Goliath grouper are not protogynous hermaphrodites, and the reproductive strategy for Nassau grouper is unknown. Shallow-water grouper spawn throughout the year, with peak spawning for most shallow-water grouper occurring in winter and spring (December through May). Black grouper, scamp, yellowfin grouper, goliath grouper, red hind and Nassau grouper are known to form spawning aggregations (Luckhurst et al. 1992; Coleman et al. 1996; Dormeier and Colin 1997; Sadovy and Eklund 1999; Eklund et al. in press). The formation of spawning aggregations is suspected for rock hind (Luckhurst et al. 1992).

3.2.1.4 Deep-water Grouper

Deep-water grouper include yellowedge grouper, misty grouper, speckled hind, warsaw grouper, and snowy grouper. These groupers occur farther offshore than shallow-water grouper, but can be caught while targeting shallow-water grouper. Recreational anglers infrequently harvest deep-water grouper. Yellowedge grouper is the most abundant and longest-lived grouper, reaching a maximum age of 85 years (Cass-Calay and Bahnick 2002). Warsaw grouper are the largest of the deep-water grouper species, reaching a maximum length and weight of 92 inches TL (233 cm TL) and 419 lbs (190 kg) (Manooch and Mason 1987). Yellowedge grouper and snowy grouper are protogynous hermaphrodites (Bullock et al. 1996; Wyanski et al. 2000). The reproductive strategy for speckled hind, warsaw grouper, and misty grouper is unknown. All deep-water grouper, except misty grouper are suspected to form spawning aggregations. Deep-water grouper appear to spawn primarily during the summer and fall.

3.2.1.5 Snappers, Jacks, Wrasses, and Triggerfishes

Snappers, jacks, wrasses, and triggerfishes are harvested or incidentally captured by recreational grouper fishermen. Most of these reef fish species are managed with bag limits, size limits, and closed seasons and several have rebuilding plans (red snapper, greater amberjack, vermilion snapper, tilefishes) that limit or prohibit harvest. Based on 2004 MRFSS intercept data, red snapper, vermilion snapper, white grunt, gray triggerfish, red porgy, lane snapper, gray snapper, and greater amberjack are the most commonly harvested non-grouper reef fishes on trips that reported catching at least one red grouper (2004 MRFSS intercept data). A brief description of the life history of each of these species is provided below.

Gray snapper, also known as mangrove snapper, occur in the Gulf of Mexico from south Florida to Louisiana. Gray snapper spawn during summer and fall (Domeier et al. 1996). Juveniles are associated with inshore seagrass beds and mangroves (Chester and Thayer 1990; Allman and Grimes 2002). Gray snapper mature by approximately age 1 to 2 and 7-8 inches (17.8-20.3 cm) in length (Manooch and Matheson 1984). Maximum length and weight of gray snapper are 35 inches TL (89 cm) and 17 pounds (7.7 kg) (Allen 1985; IGFA 2003). Maximum age of gray snapper is estimated to be 24 years (Burton 2001).

Gray triggerfish are widely distributed in tropical and temperate waters throughout the Atlantic. In the Western Atlantic, it ranges from Nova Scotia through Bermuda and the GOM to Argentina (Harper and McClellan, 1997). Gray triggerfish spawn from June through September, and form nests/burrows to lay their eggs (Hood and Johnson 1997). Maximum age is estimated to be 14 years (Hood and Johnson 1997). Most gray triggerfish are mature by one year of age and 10 inches FL (250 mm). Tagging studies suggest gray triggerfish have very high site fidelity (Johnson and Saloman 1984; Ingram 2001).

Greater amberjack are caught primarily along the west coast of Florida westward to the Mississippi River. Greater amberjack are moderately long-lived, reaching a maximum age of 15 years in the Gulf (Thompson et al. 1999). Females mature at approximately 2 to 3 years of age and 34 inches (86.4 cm) TL (Manooch 1984). Females grow larger and older than males (Burch

1979; Thompson et al. 1999). Maximum reported length and weight for greater amberjack is 78 inches FL (197 cm) and 156 pounds (70.6 kg) (Thompson et al. 1999; IGFA 2003).

Lane snapper range from north Florida to Brazil and occur throughout the Caribbean. Spawning occurs from March through September, with peak spawning occurring in June through August (Manooch and Mason 1984). In the northern GOM, lane snapper have been estimated to reach 17 years of age (Johnson et al. 1995). Lane snapper mature by approximately age-1 and 6 inches (15.2 cm) TL. They occur over a variety of habitats, including reefs, rocky outcroppings, seagrasses and mangrove prop roots.

Red porgy are an unregulated reef fish species in the GOM. Red porgy occur in the eastern and western Atlantic, and in the Gulf of Mexico near hard bottom areas off the west-central Florida coast, the Florida Middle Grounds, and the Flower Garden Banks off Texas (Nelson 1988; Hood and Johnson 2000). Maximum age has been estimated to be 17 years (Hood and Johnson 2000). They are protogynous hermaphrodites, transitioning from females to males at older ages and larger sizes (Hood and Johnson 2000). Females are fully mature by 4 years of age and 12 inches TL (302 mm TL) (Hood and Johnson 2000). Red porgy spawn from January through April.

Red snapper are found from North Carolina to the Florida Keys, and into the GOM to the Yucatan off Mexico (Robins et al. 1986). Adults are found over coral reefs, rock outcroppings, and gravel bottoms, and are associated with oil rigs and other artificial structures (GMFMC 2004a). Most landings occur from Texas to the panhandle of Florida. Eggs and larvae are pelagic while juveniles are found associated with bottom features (e.g., low relief shell) or over barren bottom. Spawning occurs during the summer and fall. Adult females mature as early as 2 years and most are mature by 4 years (Schirripa and Legault 1999). Red snapper have been aged up to 53 years, but most caught by the directed fishery are 2- to 4-years old (Wilson and Nieland 2001). Tagging studies have shown that red snapper can migrate large distances, especially after the occurrence of hurricanes (Watterson et al. 1998; Patterson et al. 2001).

Vermilion snapper are caught throughout the GOM, and most landings occur in Florida (Schirripa, 1998). They are usually found near hard bottom areas off the west-central Florida coast, the Florida Middle Grounds, and the Texas Flower Gardens (Smith et al. 1975; Smith 1976; Nelson 1988). Initial growth of vermilion snapper is rapid, reaching an average of about 8.3 inches (210 mm TL) by age 1 (Zastrow 1984; Nelson 1988; Hood and Johnson 1999; Allman et al. 2001). Maximum age is estimated to be 21 years (Allman et al. 2001). Most fish caught in the fishery are between 4- and 6-years old (Hood and Johnson 1999; Allman et al. 2001). Most females are sexually mature by 8 inches TL (200 mm) (Hood and Johnson 1999). Spawning occurs from the late spring to early fall (Nelson 1988; Hood and Johnson 1999).

White grunt is an unregulated species in the GOM. They occur in tropical and warm-temperate climates in the South Atlantic, Caribbean and eastern Gulf of Mexico. White grunt have been estimated to reach ages of up to 18 years in the GOM (Murie and Parkyn 1999). White grunt from more northern latitudes have been observed to grow larger and weigh more than white grunt from southern latitudes, such as Florida (Potts and Manooch 2001). They spawn in the GOM from April through September, with peak spawning occurring during April and May (Murie and Parkyn 1999).

3.2.1.6 Coastal Migratory Pelagics

Spanish mackerel, king mackerel, cobia, bluefish, cero mackerel, dolphin, and little tunny are all included in the Coastal Migratory Pelagics FMP. King mackerel are found throughout the Gulf of Mexico and Caribbean Sea and along the western Atlantic from the Gulf of Maine to Brazil. Spawning occurs generally from May through October with peak spawning in September (McEachran and Finucane 1979). Typically, adult king mackerel are found in south Florida and south Texas/Mexico in the winter and in the northern Gulf in the summer. King mackerel mature at approximately age 2 to 3 and have longevities of 24 to 26 years for females and 23 years for males (Brooks and Ortiz 2004).

Spanish mackerel occur from southern New England to the Florida Keys and throughout the Gulf of Mexico (Godcharles and Murphy 1986). Adults usually are found in neritic waters and along coastal areas. They inhabit estuarine areas, especially higher salinity areas, during seasonal migrations, but are considered rare and infrequent in many Gulf estuaries. Spawning occurs along the inner continental shelf from April to September (Powell 1975). Like king mackerel, adult Spanish mackerel are migratory, generally moving from wintering areas of south Florida and Mexico to more northern latitudes in spring and summer. Spanish mackerel generally mature at age 1 to 2 and have a maximum age of approximately 11 years (Powell 1975).

Cobia are the only other coastal migratory pelagic species subject to regulations. Cobia migrate northward from the Florida Keys during spring and occupy inshore and nearshore waters from northwest Florida to Texas during March through October (Biesiot et al. 1994; Franks et al. 1999). Cobia growth is very rapid during the first few years of life, after which it slows. Females grow larger than males. Maximum age is 10-12 years (Burns et al. 1998; Franks et al. 1999). Spawning occurs from April to September (Biesiot et al. 1994). Female cobia mature at approximately 32 inches FL (80 cm FL) and 2-3 years of age (Brown-Peterson et al. 2001).

3.2.1.7 Protected Species

There are 28 cetacean and one sirenian species that have confirmed occurrences in the GOM. All of these species are protected under the Marine Mammal Protection Act ((MMPA). Additionally, six of these species (blue, fin, humpback, right, sei, and sperm whales) are listed as endangered species under the ESA. All five species of sea turtles found in the Gulf (Kemp's ridley, loggerhead, green, leatherback, and hawksbill) are protected under the Endangered Species Act (ESA). The endangered smalltooth sawfish is the only marine fish species listed under the ESA that is known to occur in federal Gulf waters.

Sperm whales are the most abundant large cetacean in the Gulf and are found throughout the GOM year-round, but in waters greater than 200 m (Schmidley 1981, Hansen et al. 1996, Davis et al. 2002, Mullin and Fulling 2003), beyond where these fisheries occur. Other endangered whales (blue, fin, humpback, right whale, and sei whales) are either uncommon or rare in the GOM. Individuals observed have likely been inexperienced juveniles straying from the normal range of these stocks or occasional transients (Mullin et al. 1994, Würsig et al. 2000).

Smalltooth sawfish occur from the central Florida Panhandle to northern Georgia. The species is only found with any regularity in Gulf of Mexico state waters from Naples, Florida to Florida Bay, with reduced numbers occurring in areas outside this center of abundance (Simpfendorfer 2001). Small (young) animals are restricted to very shallow waters, thus do not overlap with the grouper fishery. Large animals roam over a much larger depth range, with records of fish being captured in over 230 ft (70 m) of water depth (Simpfendorfer 2001).

Loggerhead sea turtles are the most abundant species of sea turtle occurring in U.S. waters. Nearshore waters of the GOM are believed to provide important developmental habitat for juvenile loggerheads. Green sea turtles are herbivores and prefer marine seagrasses and algae in shallow bays, lagoons and reefs (Rebel 1974). Green sea turtles nest on the Atlantic coast of Florida, although occasionally nesting has been documented in southwest Florida. Hawksbills feed on a wide variety of sponges and the largest hawksbill nesting population occurs off of Yucutan, Mexico (NMFS 2005). Kemp's ridley sea turtles nest in aggregations along the Mexican coast and are in the early stages of recovery after decades of declines in population abundance (NOAA Fisheries 1998). The leatherback sea turtle is distributed throughout the world, including the GOM. They are predominately pelagic and feed on jellyfish. Additional information about the life history and biology of sea turtles can be found in NMFS 2005.

3.2.2 Status of Reef Fish Stocks

Many reef fish stock assessments and reviews can be found online at the Council's website (www.gulfcouncil.org) or on the Southeast Fisheries Science Center's (SEFSC) website (www.sefsc.noaa.gov). Additionally, more complete descriptions of the status of some reef fish species are provided in the draft EIS to the Generic EFH Amendment (GMFMC 2004a) and Amendment 22 to the Reef Fish FMP (GMFMC 2004b).

Stock assessments have been completed for ten GOM reef fish species, four of which are groupers (red grouper, gag, goliath grouper, and yellowedge grouper). Red grouper is currently undergoing overfishing, but not overfished (SEFSC 2002; NOAA Fisheries 2004a). Gag was recently reclassified from not overfished but approaching an overfished condition to neither overfished or undergoing overfishing (NOAA Fisheries 2004c). Goliath grouper is overfished and the status of yellowedge grouper is unknown (NOAA Fisheries 2004c). While no assessment has been conducted on Nassau grouper, landings progressively declined from 1979 to 1992 (GMFMC 1996). Amendment 14 to the Reef Fish FMP of the Gulf of Mexico prohibited the harvest of Nassau grouper and the stock is considered overfished (GMFMC 1996). The status of other grouper species that have not been assessed is unknown.

Four grouper species have been listed by NOAA Fisheries as candidate species for endangered or threatened species status. Goliath grouper and Nassau grouper were listed in 1991, and warsaw grouper and speckled hind were listed in 1997. These species were listed as candidate species based on evidence that the biological status of these species had declined and that the species faced a high degree of threat. The Council currently prohibits the harvest of Nassau and goliath grouper.

Stock assessments for six other reef fish species (vermilion snapper, red snapper, yellowtail snapper, greater amberjack, gray triggerfish, and hogfish) have been completed. Red snapper and vermilion snapper are overfished and undergoing overfishing. A revised red snapper rebuilding plan (GMFMC 2004b) and a vermilion snapper rebuilding plan (GMFMC 2004c) were recently implemented. Greater amberjack is considered overfished. A rebuilding plan for greater amberjack was implemented in Secretarial Amendment 2 to the Reef Fish FMP (NOAA Fisheries 2004b). An assessment of yellowtail snapper indicated the stock was not overfished or undergoing overfishing. Stock assessments were not able to resolve the status of the gray triggerfish and hogfish stocks; therefore, the status of these stocks is unknown. The status of other reef fish stocks that have not been assessed is unknown.

3.2.3 Status of Coastal Migratory Pelagic Stocks

King mackerel are not considered overfished or undergoing overfishing. The 2004 stock assessment indicated that the biomass (B) has not fully recovered to B_{MSY} . $B_{2001/2002}$ is 93 percent of B_{MSY} . Fishing mortality (F) continues to be below F_{MSY} and F_{OY} ($F_{2001/2002}$ was 59 percent of F_{MSY}) (SEDAR 5 Gulf of Mexico King Mackerel Advisory Report).

Spanish mackerel are also not considered to be overfished or undergoing overfishing. The current biomass for 2003 was estimated to be 1.34 times B_{MSY} . Current fishing mortality ($F_{2002/2003}$) was estimated to be 53 percent of F_{MSY} (MSAP 2003).

The status of cobia was assessed in 2001 (Williams 2001). The assessment was inconclusive in determining the status of the Gulf cobia stock. The natural mortality rate for cobia is unknown, and the choice of natural mortality rate greatly affected the outcome of the assessment. Despite this shortcoming, the assessment was able to conclude with some certainty that the cobia population had increased in abundance since the 1980s (Williams 2001).

The status of other coastal migratory pelagic (CMP) species is either unknown or considered preliminary (Prager 2000; Brooks 2002; Heinemann 2002; Turner and Brooks 2002).

3.2.4 Interactions with Protected Resources

The MMPA requires commercial fisheries to be placed in one of three categories, based on the relative frequency of incidental serious injuries and mortalities of marine mammals in each fishery. These MMPA categories are relevant to the recreational grouper fishery because similar gear (hook-and-line) is used to harvest reef fish commercially. Category I designates fisheries with frequent serious injuries and mortalities incidental to commercial fishing; Category II designates fisheries with occasional serious injuries and mortalities; Category III designates fisheries with a remote likelihood or no known serious injuries or mortalities. The GOM hook-and-line reef fish fishery is listed in Category III, as there have been no documented interactions between this fishery and marine mammals (69 FR 231).

Whales are not known to be adversely affected by the reef fish fishery because they are extremely unlikely to overlap geographically. Recreational anglers infrequently take sea turtles. Loggerhead, leatherback, Kemp's ridley and green sea turtles are known to bite baited hooks,

and loggerheads and Kemp's ridleys frequently ingest these hooks (NMFS 2005). During 2001-2003, it was estimated that recreational anglers spent 35.7 million hook-hours fishing for reef fish, during which an estimated 111 hard-shell sea turtles were caught; 40 of which died (NMFS 2005).

The decline in smalltooth sawfish abundance is attributed to bycatch in various commercial fisheries, compounded by habitat degradation. Juveniles primarily occur in shallow water and do not overlap with the grouper fishery. During 2001-03, it was estimated that four smalltooth sawfish were caught and released alive by the hook-and-line recreational reef fish fishery (NMFS 2005).

A recently completed biological opinion (February 15, 2005) conducted for the Gulf reef fish fishery evaluated the effects of reef fish fishing activities in the Gulf EEZ and found that mortalities of endangered and threatened species are uncommon from hook-and-line gear used in the reef fish fishery and were not likely to jeopardize the continued existence of threatened or endangered species. Assessments of the level of take were not then considered a high priority. However, the opinion did identify two reasonable and prudent measures. These were:

- 1) NMFS must ensure that any caught sea turtle or smalltooth sawfish is handled in such a way as to minimize stress to the animal and increase its survival rate.
- 2) NMFS must ensure that monitoring and reporting of any sea turtles or smalltooth sawfish encountered: a) detects any adverse effects resulting from the GOM reef fish fishery; b) assesses the actual level of incidental take in comparison with the anticipated incidental take documented in that opinion; c) detects when the level of anticipated take is exceeded; and d) collects improved data from individual encounters.

Amendment 18A to the Reef Fish FMP is currently under development by the Gulf Council and will examine alternatives to minimize any stress to endangered species incidentally caught in the fishery.

3.3 Economic and Social Environment

3.3.1 Recreational Harvest

The recreational fishery in the Gulf includes private anglers fishing from shore, private or rental boats, or charterboats and headboats (party boats), collectively known as for-hire vessels. The recreational sector is a very important component of the overall reef fish and coastal migratory pelagics fisheries in the Gulf of Mexico.

Reef fish harvests have been recorded through the MRFSS since 1979; however, data collected prior to 1981 are no longer used due to revisions in the estimation procedures that could not be applied to the earlier years of data. The MRFSS covers the shore, private/rental boat, and charterboat modes for Alabama, Florida, Louisiana, and Mississippi. The SEFSC's Headboat Survey has covered the headboat sector in all states in the Gulf of Mexico since 1985. Texas private and charterboat harvests are captured by the Texas Parks and Wildlife Department recreational survey.

Table 6 contains the landings of red grouper and gag, the two most important grouper species caught by the recreational sector. For these species, the dominant fishing mode is the private/rental mode, followed by charter mode, and then by headboat. The shore mode accounts for very low landings of gag and red grouper.

3.3.2 Recreational Anglers

In 2003, approximately 3.3 million in-state anglers (anglers who fished within their state of residence) took almost 23 million trips and caught over 167 million fish. These totals do not include activity occurring solely in Texas (all modes) or in the headboat sector (all Gulf states). More than 70 percent of these anglers fished in Florida, followed by, in decreasing order, Louisiana, Alabama, and Mississippi. Similarly, Florida accounted for a large percentage of the trips (70 percent), followed in order by Louisiana, Alabama, and Mississippi. The most commonly caught non-bait species were spotted seatrout, red drum, gray snapper, white grunt, sand seatrout, sheepshead, red snapper, king mackerel, and Spanish mackerel.

Social and economic characteristics of recreational anglers are collected periodically as an add-on survey to the MRFSS. Holiman (1999) and Holiman (2000) summarize the data from the 1997-1998 survey. Table 7 contains some of the major findings of this survey.

The typical Gulf marine recreational angler was 44 years old, male (80 percent), white (90 percent), employed full time (92 percent), and had an average annual household income of \$42,700. The average number of years fished in the state was 16. The average number of fishing trips taken in the 12 months preceding the interview was approximately 38 and these trips were mostly (75 percent) one-day trips. The average expenditure on the intercepted trip was less than \$50. Seventy-five percent of the surveyed anglers reported they held saltwater licenses, and 59 percent owned boats used for recreational saltwater fishing. Those anglers who did not own their own boat spent an average of \$269 per day on boat fees when fishing on a party/charter or rental boat. About 76 percent of the surveyed anglers were employed or self-employed and the majority of those unemployed were retired.

Using the 1997-1998 socioeconomic data, Haab et al. (2001) estimated three types of economic values: 1) Value of access to sites for individual anglers; 2) value of access to species for individual anglers; and 3) value associated with changes in the ability of anglers to catch fish. The value for site access is generally interpreted as the value lost when a fishing site is closed to fishing. An analogous interpretation holds for the species access value; that is, it is the value associated with a prohibition for fishing for a specific fish species. The value of a unit increase in species caught and kept refers to the angler's valuation of the worth of an extra fish caught and kept above expenditures.

Haab et al. (2001) estimated the following values associated with the private/rental fishing mode. The economic loss per trip from closing a fishing site ranged from \$1.44 in Alabama to \$71.84 in west (Gulf) Florida. The loss was also estimated to be relatively high in Louisiana. The economic loss per trip from unavailability (closure) of snapper-grouper ranged from \$0.30 in Alabama to \$5.24 in west Florida, whereas the value of a unit increase in the catch of snapper-

grouper ranged from \$0.27 in Alabama to \$4.15 in west Florida. For all fishing modes, the economic loss per trip from closing a fishing site ranged from \$1.84 in Alabama to \$54.14 in west Florida, whereas the economic value from a unit increase in the catch of bottom fish (which include other reef fish species) ranged from \$3.47 in Alabama to \$3.65 in west Florida.

3.3.3 For-hire sector

A federal for-hire vessel permit for coastal migratory pelagics (CMP) has been required since 1987 and for reef fish since 1996. A moratorium on the issuance of new for-hire vessel permits for CMP and reef fish took effect on June 16, 2003. The current 3-year moratorium is set to expire on June 16, 2006, although continuation of the moratorium is under consideration. NMFS has issued 3,340 permits associated with 1,779 unique vessels. Of these vessels, 1,561 have both reef fish and CMP permits, 64 have only reef fish permits, and 154 have only CMP permits.

Approximately 79 percent of the for-hire vessels (1,404) have a maximum capacity of 6 or fewer passengers. The rest are distributed relatively evenly among the other passenger capacity classes, with 61 vessels in the highest category of greater than 60 passengers. The majority (82 percent) of the vessels are in the 21-50 foot (6.4-15.2 m) length range and 70 percent have engines ranging from 101 to 600 horsepower. Individual ownership is the dominant form of ownership type (69 percent). A little less than a third of vessels are corporate-owned. Florida is the homeport of 61 percent of all federally permitted for-hire vessels, followed by Texas (13 percent), Alabama (8 percent), Louisiana (8 percent), and Mississippi (4 percent). Approximately 5 percent of all vessels are home ported in non-Gulf states, with North Carolina being the dominant homeport state outside the Gulf of Mexico.

Permitted for-hire vessels engage in many activities. Some operate only as charterboats, some only as headboats, and others in various combinations as charterboats, headboats, and commercial fishing vessels. The possession of a for-hire vessel permit does not require a vessel to operate solely as a for-hire vessel, although the for-hire permit does prohibit the vessel from exceeding the maximum number of passengers specified by the permit.

Financial information on the for-hire vessels in the Gulf is not routinely collected. The most recent data available are from two MARFIN-funded studies conducted in 1998-1999 and summarized in Holland et al. (1999) and Sutton et al. (1999). Selected financial statistics from these studies are summarized in Table 8. Included in the cost estimates are bookkeeping services, advertising and promotion, fuel and oil, bait expenses, docking fees, food/drink for customers and crew, ice expenses, insurance expenses, maintenance expenses, permits and licenses, and wage/salary expense. The cost calculations do not account for capital expenses, other fixed costs and returns to owners/operators. The 1999 figures have been adjusted to 2004 dollars using the producer price index for all commodities, with 1982-1984 as the base year.

As expected, since they carry larger passenger loads, headboats earn substantially higher revenues than charterboats. The average charterboat is estimated to generate \$76,960 in annual revenues and \$36,758 in annual profits, whereas the appropriate values for the average headboat are \$404,172 and \$338,209, respectively. On average, both types of operations are profitable, with the headboat operation showing a relatively large profit figure. As mentioned above,

however, the calculation of costs does not take into account fixed costs, which would be expected to be much larger for headboats. For both charterboats and headboats, the number of passengers carried per trip is about half of the maximum passenger capacity. Therefore, substantial excess capacity exists in the sector.

Table 9 depicts the for-hire sector by geographical areas. Florida vessels, on average, earn less than those in the rest of the Gulf. This difference may be due partly to the difference in the size of charterboat or headboat operation. On average, Florida vessels are smaller in size, have smaller horsepower, have lower maximum passenger capacity and take fewer passengers per trip. Another potential reason for the difference, although not apparent from the information provided, is the increased competition created by the larger number of vessels in the state.

3.3.4 Fishing communities

A “fishing community” is defined in the MSFCMA, as amended in 1996, as “community which is substantially dependent on or substantially engaged in the harvesting or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community” (MSFCMA section 3(16)). The national standard guidelines (May 1, 1998; 63 FR 24211) define a fishing community as a social or economic group whose members reside in a specific location and share a common dependency on commercial, recreational, or subsistence fishing or on directly related fisheries-dependent service and industries (for example, boatyards, ice suppliers, tackle shops).

Social and cultural research suggests that assessments of regulatory impacts on fishing-dependent communities consider not only geographic definitions of communities and economic characteristics therein, but also the level of vulnerability or resilience, of fishing communities and operations (McCay 2000). That is, questions of fishing dependence and “sustained participation” in fisheries must consider how able participants in a given fishery can move among fishery sectors, and how able they are to move out of the fishery altogether into alternative employment opportunities. Studies must take into account not only the economic characteristics but also the demographic and social characteristics of the areas where fishing activity occurs and strategies for assessing and ranking these characteristics and variables must be developed and analyzed. Some factors that have been previously used to assess a community’s dependence on fishing include:

- 1) Economics, including percent employment in fishery-related industries, and unemployment levels, and income;
- 2) Fisheries characteristics, including landings by species by various sectors;
- 3) Fishing-related businesses, for example numbers of marinas, rentals, snorkel and dive shops, boat dockage and repair facilities, tackle and bait shops, fish houses, and lodgings related to recreational fisheries industry;
- 4) Fishing-related activities, such as seafood festivals;
- 5) Presence of organizations, such as commercial fishing associations;
- 6) Numbers of dealers/ processors;
- 7) Isolation or integration of the fishery into alternative economic sectors (Do the fishers represent a political-economic enclave or are they integrated into the community?);
- 8) Percent of population in fishery or fishery-related industry;

- 9) Percentage of income derived from fishing;
- 10) Time commitment (number of months per year, and number of years of experience, etc.);
- 11) Flexibility index (number of species able to fish, gears/vessels, etc.);
- 12) Number of different kinds of vessels;
- 13) Relationship to the seafood marketing/processing sector;
- 14) Vessel sizes and sizes of crew by port/ dockage site; and
- 15) Diversity of species targeted, gear, type and size and vessel by port/ dockage site.

Although these factors do not represent a comprehensive list of all factors that could be considered when defining a fishing community, they provide a snapshot of factors that represent or can be used to assess a community's dependence on fishing. There is very little qualitative information on fishermen, fishing-dependent businesses, or communities that depend on the GOM reef fish fishery. Social science research is currently being conducted by NMFS in communities in the Gulf of Mexico. Until this research is completed, and in-depth community profiles are developed for some sample communities, it is not possible to fully understand the possible impacts of any change in federal fishing regulations to the reef fish fishery.

Holland et al. (1999) identified the following areas as major activity centers for charterboats in Florida: Miami, Fort Lauderdale, Key West, Marathon, Islamorada, Naples, Ft. Myers, Ft. Myers Beach, Panama City, Panama City Beach, Destin and Pensacola. They also identified the following as major activity centers for headboats in Florida: Miami, Key West, Marathon, Islamorada, Ft. Myers, Ft. Myers Beach, Clearwater, Destin, Panama City and Panama City Beach. Sutton et al. (1999) identified the following areas as major activity centers for charterboats in the rest of the Gulf: South Padre Island, Port Aransas, and Galveston-Freeport in Texas; Grand Isle-Empire-Venice in Louisiana; Gulfport-Biloxi in Mississippi; and, Orange Beach-Gulf Shores in Alabama. They also identified the following areas as major activity centers for headboats in the rest of the Gulf: South Padre Island, Port Aransas, and Galveston-Freeport in Texas and Orange Beach-Gulf Shores in Alabama.

Profiles of these communities relevant to fishery management do not currently exist. Additional information on these communities can therefore not be provided at this time.

3.4 Administrative Environment

3.4.1 Federal Fishery Management

Federal fishery management is conducted under the authority of the MSFCMA (16 U.S.C. 1801 et seq.). The MSFCMA claims sovereign rights and exclusive fishery management authority over most fishery resources within the EEZ and authority over U.S. anadromous species and continental shelf resources that occur beyond the EEZ.

Responsibility for federal fishery management decision-making in the GOM is divided between the Secretary and the Council. The Council is responsible for preparing, monitoring, and revising management plans for fisheries needing management within their jurisdiction. Currently the Council has FMPs for coastal migratory pelagics, reef fish, coral and coral reefs, spiny lobster, stone crabs, red drum, and shrimp. The Secretary is responsible for promulgating

regulations to implement proposed plans and amendments after ensuring that management measures are consistent with the MSFCMA, and with other applicable laws. In most cases, the Secretary has delegated this authority to NMFS.

A variety of commercial and recreational fishing regulations have been implemented for GOM fisheries, including: quotas, limited entry programs, bag limits, trip limits, closed seasons and areas, and size limits. A quota has been established for the recreational red snapper fishery. Charter and headboat permits are currently under a moratorium in order to cap fishing effort. Bag limits, size limits, closed areas, and closed seasons have been established to reduce fishing mortality and protect spawning fish.

The SEFSC conducts a variety of research and monitoring activities to support management of fishery resources in the Gulf of Mexico and South Atlantic. Some of the activities conducted by the SEFSC include: biological and socio-economic research, collection of landings and fishing effort data, monitoring quotas, and conducting stock assessments.

Federal fishing regulations are enforced through actions of the NOAA's Office of Law Enforcement, the United States Coast Guard (USCG), and various state authorities. To better coordinate enforcement activities, federal and state enforcement agencies have developed cooperative agreements to enforce the MSFCMA.

3.4.2 State Fishery Management

State representatives participate on the Council in order to ensure participation in federal fishery management decision-making and to promote the development of compatible regulations in state and federal waters. The state governments of Texas, Louisiana, Mississippi, Alabama, and Florida have the authority to manage their respective state fisheries including enforcement of fishing regulations. Each of the five Gulf states exercises legislative and regulatory authority over their natural resources and cooperate with numerous state and federal regulatory agencies when managing marine resources. Additional information about each state's marine fisheries management agency can be found at:

Alabama Department of Conservation and Natural Resources – www.dcnr.state.al.us

Florida Fish and Wildlife Conservation Commission – www.myfwc.com/marine

Louisiana Department of Wildlife and Fisheries – www.wlf.state.la.us

Mississippi Department of Marine Resources - www.dmr.state.ms.us

Texas Parks and Wildlife Department - www.tpwd.state.tx.us

4.0 ENVIRONMENTAL CONSEQUENCES

This section provides the scientific and analytical basis for comparing the alternatives described in Section 2.0. The potential direct, indirect, and cumulative effects on the physical, biological, socioeconomic, and administrative environments for each management alternative are described below. This section also describes: 1) any unavoidable adverse effects resulting from the

proposed action, 2) the relationship between short-term uses of man's environment and long-term productivity, and 3) any irreversible or irretrievable commitments of resources resulting from implementation of the proposed action.

CEQ regulations (40 CFR 1508.8) define direct effects as those "which are caused by the action and occur at the same time and place." Indirect effects are defined as those "which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable." Cumulative effects are defined as "impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions."

This interim action would be effective for a maximum of 360 days (180 days + one additional 180 day extension). Because of the short duration of this action, all effects on the environment are expected to be short-term. The following describes direct and indirect effects on the environment during the time period this interim action would be effective. Such effects would be expected to continue over the long-term if the Council establishes permanent recreational management measures after this interim action.

4.1. Direct and Indirect Effects on the Physical Environment

4.1.1 Action 1: Red Grouper Harvest Reduction Alternatives

Alternative 1 (status quo) would maintain status quo regulations, which include a two red grouper bag limit and 20-inch minimum size limit. The primary effects of the recreational grouper fishery on the physical environment generally result from fishing gear interactions with the sea floor. Regulations, such as increases in size limits, can increase the amount of time spent fishing and result in increased effort and more gear interactions with the seafloor.

Fishing gear can damage or disturb bottom structures and occasionally incidentally harvest such habitat. Direct effects resulting from **Alternative 1 (no action)** include physical damage to habitat associated with hook-and-line tear-offs and abrasions, and anchoring. Longer-term indirect effects would result if hook-and-line gear is not removed and causes marine life to become entangled or overgrown with algae. In the short-term, the effects of **Alternative 1 (no action)** are not likely to be different than current fishery conditions. Also, because the recreational fishery represents a minor component (~20 percent) of the overall red grouper fishery, adverse impacts on the physical environment are expected to be small relative to overall harvest.

The primary gear used to harvest grouper in the recreational fishery is hook-and-line, although some grouper are harvested by spearguns and powerheads. Generally, hook-and-line gear is considered to have less damaging effects on habitat when compared to other forms of fishing gear, such as fish traps or trawls. Vertical-line gear and weights can snag and entangle bottom structures and cause tear-offs or abrasions (Barnette, 2001). If lost or improperly disposed, vertical lines may result in long-term damage to habitat by entangling marine life, such as corals (Hamilton 2000; Barnette 2001). Anchors can also directly damage habitat if placed or dragged over reefs and other bottom habitat.

The degree to which the grouper fishery directly or indirectly affects bottom habitat is unknown, but depends largely on the vulnerability of the affected habitat to disturbance, and on the rate that the habitat can recover from disturbance (Barnette 2001). Corals are more vulnerable to adverse impacts from fishing gear and slower to recover from such impacts than sand and mud bottom habitat (Barnette 2001). As discussed in Section 3.0, red grouper typically occur over hard bottom areas, which are less vulnerable to gear impacts than other habitats, such as coral.

Alternative 2 would decrease the red grouper bag limit from two to one red grouper per angler. This alternative could result in short-term beneficial effects to the physical environment if anglers stop fishing once reaching their bag limit. The reduced time spent harvesting red grouper would result in less gear interactions with the seafloor. However, because red grouper are part of a multispecies fishery, reductions in fishing effort (time spent fishing) are unlikely to occur because anglers would continue targeting other groupers that co-occur with red grouper. Short-term beneficial effects could also occur if the one red grouper bag limit deters some anglers from targeting or harvesting red grouper, thus reducing the number of habitat interactions. Overall, **Alternative 2** will likely have small, short-term benefits when compared to **Alternative 1 (no action)**.

Alternative 3 would reduce the red grouper bag limit from two to one and establish a two to four month closed season. This alternative would result in positive short-term direct benefits to the physical environment if the closed seasons and lower bag limit deter anglers from taking fishing trips. If anglers take less fishing trips or target coastal migratory pelagics, which are caught at or near the surface, fewer gear interactions with physical habitat would occur. Phone calls and public comments from charterboat operators have indicated closed seasons would affect their businesses and result in fewer bookings, especially in southwest Florida. **Alternative 3** would have greater positive effects on the physical environment than **Alternative 2**, because closed seasons for all groupers would likely reduce the number of fishing trips more than a reduction to the red grouper bag limit alone. Landings for red grouper are highest during the summer and lowest during the beginning and end of the year when fishing effort and trips are lower. Longer closures that include months with higher landings and fishing effort will likely have greater positive benefits to the physical environment than shorter closures that include months with lower levels of landings and fishing effort. **Alternative 3d**, which would close the fishery for four months from August to November would likely have the greatest short-term positive benefits to the physical environment, followed by **Alternative 3b**, **3a**, and **Preferred Alternative 3c**, respectively. Closures late in the year would benefit the physical environment less because fishing effort and trips are lower during that time when compared to summer, when fishing trips and landings peak. However, the benefits of each of these alternatives to physical habitat are expected to be small and cannot be quantified, when compared to status quo.

Alternative 4 would close the fishery for all grouper from July 1 through December 31, 2005. This alternative would have the greatest positive benefit to the physical environment of any of the alternatives considered. Closing the grouper fishery for six months would likely deter many people from going fishing or would at minimum reduce the number of fishing trips taken, thereby reducing gear interactions with habitat. Additionally, if effort shifts to species, such as coastal migratory pelagics, gear interactions with habitat would be reduced because CMP species

are caught at or near the ocean surface. The overall benefits of this alternative to the physical environment could be diminished, if anglers continue to target reef fishes, such as snapper, which occur in similar habitats as grouper.

Alternative 5 would increase the minimum size limit to either 22- or 23-inches TL (**Alternative 5a-b**). Both **Alternative 5a** and **5b** would likely result in small negative effects on the physical environment in the short-term if size limits increase the amount of time anglers spend fishing to catch legal-size red grouper and fill their bag limit. Any additional time spent fishing would result in additional gear interactions with habitat. However, because hook-and-line gear has less damaging effects than other fishery gears, any negative effects associated with size limits are expected to be small and unquantifiable when compared to **Alternative 1-4**.

4.1.2 Action 2: Aggregate Bag Limit Alternatives

The effects of hook-and-line fishing on the physical environment are described in Section 4.1.1. **Alternative 1 (no action)** would maintain the five grouper aggregate bag limit. This alternative is not expected to reduce harvest or change the gears used for harvest. Direct effects resulting from **Alternative 1 (no action)** would include physical damage to habitat associated with hook-and-line tear-offs and abrasions, and anchoring. Indirect effects would result if hook-and-line gear is not removed and causes marine life to become entangled or overgrown with algae. In the short-term, the effects of **Alternative 1** are not likely to be different than current fishery conditions. **Alternative 1** is not expected to significantly impact the physical environment because the recreational fishery primarily occurs over hard bottom habitat and represents a small portion of the overall red grouper harvest.

Alternatives 2-4 would reduce the aggregate bag limit to 4, 3, or 2 fish. Positive short-term benefits could result from these alternatives if the lower bag limits deter anglers from bottom fishing or deter anglers from taking trips to harvest grouper. However, it is estimated that only 5.5 to 8.7 percent of fishing trips would be affected by lowering the aggregate bag limit (Strelcheck 2005a), implying that few anglers currently keep 2 to 4 groupers per trip. Therefore, lower aggregate bag limits alone are not likely to deter anglers from targeting grouper because most anglers currently do not catch the allowable aggregate bag limit. The lower the aggregate bag limit, the more likely anglers would target other species or not take a fishing trip at all. If anglers target other species, such as coastal migratory pelagics, positive short-term benefits would result. Coastal migratory pelagics are caught with hook-and-line near the surface, and therefore hook-and-line gear has minimal or no contact with physical habitat. Overall, the short-term benefits of **Alternatives 2-4** are expected to be small and likely indistinguishable from status quo.

If lower aggregate bag limits are combined with a one red grouper bag limit (**Alternative 2, Action 1**) and/or closed seasons (**Alternatives 3a-d, Action 1**), additional positive benefits to the physical environment could result beyond those described in Section 4.1.1. Additional positive benefits would occur if the combination of these regulations further deters anglers from targeting grouper or taking fishing trips. Longer closures during peak fishing periods combined with a lower aggregate bag limit are expected to have the greatest benefits to the physical environment. However, the overall benefits to the physical environment are expected to be small

and unquantifiable because hook-and-line is a less damaging gear than most other gears. Also, grouper are primarily harvested over hard-bottom habitat and recreational harvest represents a small component of the overall landings.

4.2 Direct and Indirect Effects on the Biological/Ecological Environment

4.2.1 Action 1: Red Grouper Harvest Reduction Alternatives

Alternative 1 (no action) would maintain existing regulations for red grouper, which include a 20-inch size limit and two fish bag limit. If these regulations remain unchanged the status of the stock could potentially worsen because overfishing would likely continue. This would result in negative effects on the biological and ecological environment. However, these effects are not expected to be significant because the recreational fishery represents a small component of the overall harvest. Currently, red grouper is under a rebuilding plan and the stock is classified as undergoing overfishing (NOAA Fisheries 2004c).

During the second year of the rebuilding plan, recreational landings were well above the specified recreational target catch level and the ABC specified by the rebuilding plan was exceeded. If future recreational landings are similar to average landings during 2003-2004, **Alternative 1 (no action)** would allow landings to continue to exceed the ABC. This could directly jeopardize the rebuilding plan for red grouper and result in additional regulatory actions and reductions in ABC in the future to rebuild the fishery. In the long-term if overexploitation is allowed to continue, changes to the age and size structure, genetic diversity, geographic range, and reproductive capacity of the stock may occur.

Red grouper are a part of a multispecies fishery that includes other groupers and snapper. Maintaining existing regulations would not affect bycatch in the short-term because **Alternative 1 (no action)** does not change the methods or gears used for harvest. Bycatch could increase without implementation of new regulations if fishing effort (number of trips or number of vessels fishing) increases or the status of the stock worsens, but this would be no different than current fishery conditions. Currently, greater than 85 percent of all red grouper caught are released primarily because of regulations (unpublished 2004 MRFSS data). The most recent stock assessment (SEFSC 2002) assumed a recreational release mortality rate of 10 percent for red grouper. Applying this release mortality rate to the number of annual MRFSS releases it is estimated that approximately 44 percent of all red grouper dying each year die from release mortality.

The most recent yield-per-recruit (YPR) analysis for red grouper was conducted in the 1993 stock assessment (Goodyear and Schirripa 1993). Based on the assessment, YPR is maximized at 18 inches TL assuming a 33 percent release mortality rate, 19 inches (48.3 cm) TL assuming a 20 percent release mortality rate, and 25 (63.5 cm) inches TL assuming no release mortality. The assessment did not evaluate YPR for a release mortality rate of 10 percent, which was the release mortality rate used for recreational caught fish in the last assessment (SEFSC 2002). Extrapolating from the 1993 stock assessment YPR models, YPR is likely maximized between 20 (50.8 cm) and 22 inches (55.9 cm) TL.

Based on the von Bertalanffy age-length equation used in the most recent stock assessment (SEFSC 2002), average age-at-first capture is estimated to be 4.42 years at 20-inch (50.8 cm) TL, 4.84 years at 21-inches (53.3 cm) TL, 5.3 years at 22-inches (55.9 cm) TL, 5.81 years at 23-inches (58.4 cm) TL, and 6.39 years at 24-inches (61 cm) TL (Figure 3). Increasing the minimum size limit by 2 inches (5.08 cm) would result in an additional 11 months (on average) for red grouper to recruit to the fishery. A 23-inch (58.4 cm) TL size limit would result in an additional 16 months (on average) for red grouper to recruit to the fishery.

Red snapper, vermilion snapper, gag, white grunt, gray triggerfish, red porgy, gray snapper, lane snapper, greater amberjack, and king mackerel are all commonly caught on trips targeting or catching red grouper (see Section 3.2.1.5). With the exception of white grunt and red porgy, each of these species is regulated by bag limits and size limits to control harvest. Red snapper is the only recreational fishery with a seasonal closure. Several of these species are overfished (greater amberjack), undergoing overfishing, or both (vermilion snapper, red snapper). Several other species have been recently rebuilt and recovered from overfishing (king mackerel, gag). In the short-term, **Alternative 1 (no action)** will not likely have adverse effects on these fisheries beyond the mortality already imposed. In the long-term, harvest and fishing effort directed toward these other species could increase if the status of red grouper worsens due to continued overfishing.

Alternative 1 (no action) is not expected to have any adverse effects on protected or threatened species. Recreational anglers infrequently take sea turtles and whales do not overlap geographically with the recreational fishery. Adult smalltooth sawfish do occur in water depths that overlap red grouper habitat, but few are incidentally caught by recreational anglers (NMFS 2005). A recently completed biological opinion (NMFS 2005) estimated the recreational fishery took 111 hard shell turtles, 40 of which died, during 2001-2003. The biological opinion also estimated that four smalltooth sawfish were caught and released by hook-and-line reef fish anglers during this same time period (NMFS 2005). **Alternative 1 (no action)** is not expected to change the number of turtles or smalltooth sawfish taken because it does not change the gears or methods of harvest. Currently, the Council is considering in Amendment 18A to the Reef Fish FMP alternatives that would mitigate and potentially reduce the number of sea turtles discarded dead by the reef fish hook-and-line fishery.

Alternative 2 would reduce the red grouper bag limit from two to one fish per recreational angler. This alternative would have a short-term positive benefit on red grouper by reducing recreational harvest by 14.8 percent during 2005 (assuming a July 1 implementation date). If the interim action were extended, a one red grouper bag limit would reduce recreational harvest by 21.9 percent annually. **Alternative 2** would increase the probability that recreational overages would not occur in 2005 when compared to **Alternative 1**. However, the likelihood of eliminating recreational overages would be less than **Alternatives 3-5**

Alternative 2 would likely result in short-term negative biological effects if the lower bag limit results in increased bycatch and regulatory discards. Because red grouper co-occur with many other snappers and groupers, red grouper discard mortality could increase if fishermen continue to target other species once reaching their one red grouper bag limit. **Alternative 2** could also have short-term impacts on gag, and other groupers. Lowering the red grouper bag limit could

shift effort to gag and other species, resulting in increased harvest and fishing mortality. Gag is currently not overfished or undergoing overfishing, but the fishery is considered to be fully utilized. The effects on protected resources are expected to be similar to **Alternative 1 (no action)**, because the hook-and-line reef fish fishery takes few protected species.

Alternative 3 would reduce the red grouper bag limit from two to one fish per angler and establish a two to four month closed season for all groupers. This alternative is estimated to have a positive biological benefit on the red grouper fishery and reduce recreational red grouper harvest in 2005 by 22 to 42 percent, depending on the length of the closed season. A one red grouper bag limit combined with longer closed seasons during late summer or early fall (**Alternative 3b** or **3d**) would have the greatest biological benefits to red grouper and result in the greatest reductions in harvest. Among the closure alternatives, **Preferred Alternative 3c** (one fish bag, November-December closure) would result in the smallest reduction in red grouper harvest (21.5 percent). **Alternative 3b** would result in slightly greater harvest reductions than **Alternative 3a**, but would close four months rather than three.

Similar to **Alternative 2**, **Alternative 3** would have short-term negative biological effects if the lower bag limit results in increased discards. Positive biological impacts to both red grouper and other groupers would result from the closed seasons. Because red grouper are part of a multispecies fishery, prohibiting the harvest of all groupers would reduce discard mortality during closure months. Gag, black grouper, and other shallow- and deep-water groupers are commonly caught when targeting red grouper, so establishing closed seasons for all groupers would reduce discard mortality for red grouper and prevent effort from shifting to other grouper if only the red grouper fishery was closed. Although not proposed in this EA, implementing closures only for red grouper would increase discard mortality of red grouper during closure months when anglers are targeting other grouper that co-occur with red grouper. Closures for all grouper would have positive biological benefits on gag, and other groupers, by reducing harvest and fishing mortality for these species. Some negative biological effects could occur if anglers continue to target other reef fishes that co-occur with grouper, resulting in increased discard mortality of groupers. Based on 2004 MRFSS data, red and vermilion snapper are the most commonly harvested non-grouper species on trips harvesting red grouper. The recreational red snapper fishery is closed during November and December each year, so closures later in the year for red grouper would reduce the effects of effort shifting on red snapper.

It is estimated the harvest of groupers, excluding red grouper, would be reduced by 17 to 35 percent depending on the closure chosen. **Preferred Alternative 3c** would reduce recreational harvest of groupers, excluding red grouper, by 17.8 percent. **Alternatives 3b** and **3d** would result in the greatest reductions in recreational grouper harvest, excluding red grouper. These alternatives would each reduce harvest by 34-35 percent. **Alternative 3a** would reduce the recreational harvest of groupers, excluding red grouper, by 26.6 percent.

Similar to **Alternatives 1 (status quo)** and **2**, **Alternatives 3a-d** are expected to have similar effects on protected resources, because few are taken by the hook-and-line reef fish fishery. Overall, **Alternatives 3a-3d** are expected to have greater biological benefits for red grouper and other groupers than **Alternatives 1 (status quo)** and **2**, because these alternatives reduce red grouper bycatch, result in greater harvest reductions to red grouper, and reduce the harvest of

other grouper species commonly occurring in the same areas and habitat as red grouper. **Alternatives 3a-3d** could result in increased negative effects on reef fish other than groupers, as well as coastal migratory pelagic species, if anglers target those species during grouper closures, resulting in increased landings and fishing mortality. Closures later in the year would prevent effort from shifting to red snapper, because the recreational fishery is closed in November and December. Similarly, king mackerel migrate to south Florida waters in the fall, reducing the likelihood that anglers would target mackerel during grouper closures.

Alternative 4 would close the grouper fishery for six months from July 1 through December 31, 2005. This alternative would have the greatest short-term biological benefit, and is estimated to reduce the recreational harvest of red grouper by 55 percent and the harvest of groupers other than red grouper by 51 percent. If landings in 2005 are similar to average landings in 2003 and 2004, this alternative would eliminate recreational overages and result in greater reductions than necessary to meet the recreational target catch level. Similar to **Alternatives 3a-d**, this alternative could result in increased discards if anglers continue targeting other reef fishes that co-occur with groupers during closure months. Negative biological impacts on other reef fish species could also occur if landings and fishing effort is directed toward those species as a result of grouper regulatory actions. Effects on protected resources are expected to be similar to the other alternatives because the hook-and-line reef fish fishery takes few protected species.

Alternatives 5a-b would increase the minimum size limit for red grouper to either 22- or 23-inches TL. Both of these alternatives would positively benefit the red grouper stock by reducing overall landings. A 22-inch size limit is estimated to reduce recreational harvest by 22 percent in 2005. A 23-inch size limit is estimated to reduce recreational harvest by 30 percent in 2005. Reductions in harvest would result in increases in the number of fish released and discarded dead. As described in **Alternative 1 (status quo)**, 85 percent of red grouper caught by recreational anglers are currently released and discard mortality accounts for approximately 44 percent of the total mortality in the recreational red grouper fishery. Increasing the minimum size limit to 22- or 23-inches would increase the amount of time it takes for red grouper to recruit to the fishery by 11 to 16 months, during which time red grouper would be susceptible to additional natural and release mortality (Strelcheck 2005b). Increases to the minimum size limit could also result in forgone yield. Extrapolating from the 2003 stock assessment (Goodyear and Schirripa 1993), yield is maximized between 20 and 22 inches TL. **Alternative 5a** is at the upper range of size limits that would potentially maximize yield, while **Alternative 5b** is greater than the estimated minimum size limit that would maximize yield.

Alternative 5 could also result in negative short-term effects on other groupers if the increased size limits result in effort shifting to gag, and other reef fish and coastal migratory pelagic species. Currently, several reef fish and coastal migratory pelagics are either overfished, undergoing overfishing, or considered to be fully utilized. Unlike **Alternatives 3 or 4**, size limit increases would not protect gag from increases in fishing mortality if effort shifts due to red grouper regulatory actions.

4.2.2 Action 2: Aggregate Bag Limit Alternatives

Alternative 1 (status quo) would maintain the five grouper aggregate bag limit. This alternative is not expected to reduce grouper harvest and it would provide no additional reductions in red grouper harvest, since the current red grouper bag limit is less than the aggregate bag limit. The five grouper aggregate bag limit has been in effect since implementation of Amendment 1 to the Reef Fish FMP in 1990. Based on 2003-04 MRFSS intercept data, only 5.5 percent of all trips intercepted harvested more than four grouper per angler; indicating most trips do not catch the currently allowed aggregate limit. Maintaining the five grouper aggregate bag limit could have short-term negative effects on other groupers (i.e., increased harvest, increased fishing mortality) if the red grouper bag limit is reduced. This would occur if anglers attempt to fill their aggregate limit with an additional non-red grouper, when previously they would have kept a second red grouper.

Alternative 1 (status quo) is not expected to increase bycatch of other fish species or protected resources since it does not change the gears or methods used to harvest grouper, and does not reduce the quantity of harvest that could be potentially harvested. As discussed in Section 4.2.1, mortalities of endangered and threatened species are uncommon from hook-and-line gear used in the reef fish fishery and are not likely to jeopardize the continued existence of threatened or endangered species. Because the aggregate grouper bag limit would remain unchanged, effort shifting to other fish species would not likely occur.

Alternatives 2-4 would reduce the aggregate bag limit to 4, 3, or 2 fish. Positive short-term benefits to the biological environment would result from these alternatives. It is estimated that a 4, 3, and 2 fish aggregate bag limit would reduce the recreational harvest of grouper, excluding red grouper, by 1.8, 5.2, and 12.0 percent, respectively. Reductions to the aggregate bag limit could result in negative effects to bycatch and discard mortality. Because groupers co-occur with other reef fishes, bycatch could increase if anglers continue targeting snappers, grunts, triggerfish, and jacks after reaching the aggregate grouper bag limit. **Alternative 4** would have the greatest negative effect on bycatch, because it is the most restrictive of the four alternatives. However, only 8.7 percent of all MRFSS intercepts harvested greater than two grouper per angler in 2003-04; indicating few trips would likely target other species instead of grouper. Relative to the other alternatives, **Alternative 4** would provide the greatest benefits to grouper, followed by **Preferred Alternative 3**, **Alternative 2**, and **Alternative 1**. The more restrictive the bag limit, the more protection provided to other groupers if effort shifting occurs as a result of increasing red grouper restrictions. The effects on protected resources would be the same as other alternatives, since hook-and-line reef fish anglers infrequently encounter protected resources.

If lower aggregate bag limits are combined with a one red grouper bag limit (**Alternative 2, Action 1**) and/or closed seasons (**Alternatives 3, Action 1**), additional positive benefits to the biological environment could result beyond those described in Section 4.2.1. If the aggregate bag limit is reduced in addition to reducing the red grouper bag limit (**Alternative 2, Action 1**), gag and other groupers would be afforded additional protection from effort shifting due to more restrictive management measures for red grouper. As mentioned above, a lower red grouper bag limit could encourage anglers to harvest another non-red grouper to replace the second red

grouper they would have previously caught. The greater the reduction to the aggregate bag limit, the more likely fishing pressure and fishing mortality will be reduced for gag and other grouper species. If the aggregate bag limit reduction is combined with **Alternatives 3a-3d in Action 1**, additional reductions in grouper harvest, excluding red grouper would occur. Lowering the aggregate bag limit combined with a six month closure for all groupers (**Alternative 4, Action 1**) would have no additional benefits in the short-term, because anglers would be prohibited from harvesting grouper during the closure. Lower bag limits combined with a size limit increase (**Alternatives 5a-b, Action 1**) would provide additional protection to other groupers if effort shifting occurs and additional fishing effort is directed toward gag, and other groupers. **Alternative 4** would provide the greatest level of protection for non-red groupers, followed by **Preferred Alternative 3, Alternative 2, and Alternative 1**.

4.3 Direct and Indirect Effects on the Economic Environment

Carter (2005) conducted an economic analysis of **Action 1, Alternatives 1-4** and **Action 2**. Due to the relatively low grouper harvests by the headboat and shore sectors, the analysis incorporated only the private/rental and charterboat modes, utilizing data from the MRFSS (NMFS 1999). In addition to the low overall grouper harvest, the omission of the headboat sector in this analysis is not particularly critical since the vessel-level nature of headboat data would only support the generation of average bag limits across all anglers on the vessel, therefore not likely indicating any effects, on average, of the alternative bag limits. However, the exclusion of the headboat sector will result in an underestimate of the impacts of closed seasons. The MRFSS is not applied in Texas. Therefore, only activity in the remaining Gulf states (Alabama, Florida, Louisiana, and Mississippi) is included. Since the grouper fishery is primarily prosecuted in the eastern Gulf, the omission of Texas activity should not significantly affect the results.

The analytical approach considers the reduction in keep of red grouper and other species in the aggregate grouper bag (for a list of these species, see Appendix A) that would have occurred if the proposed interim action were in place during 2003 (final data) and 2004 (preliminary data). Harvest activity for these years shows that red grouper harvests in 2004 were relatively large whereas harvests in 2003 were relatively low. Therefore, the range of effects of the alternatives in these two years should reasonably bound the possible effects of the policies if implemented in 2005. This range may also accommodate any under- or over-estimation of impacts that results from the exclusion of the headboat and Texas sectors from the analysis.

The analysis evaluated three types of policies: individual angler daily red grouper bag limits; individual angler daily aggregate grouper bag limits; and grouper fishery closures. The analysis assumes that the changes in value from these policies are manifest in changes in the number of fish kept, rather than in fish caught or the number of trips taken. Furthermore, the effects are valued in terms of changes in fish kept from the GOM reef fish complex (for a list of these species, see Appendix B) by anglers who targeted these species. This sub-population of anglers, as opposed to just anglers who targeted red grouper or species in the aggregate grouper bag, was selected to be consistent with the stratification of economic value results contained in the most recent economic analysis of marine recreational fishing in the Southeastern U.S. (Haab, et al., 2001). Table 23 shows the average estimated value by state of a one fish increase in keep of

species from the GOM reef-fish complex. Economic value estimates are not available for individual reef fish species, nor are they available by species group by mode fished.

Since the evaluation focused on changes in fish harvested, the implicit assumption was that effort patterns would not change, trips would not be reduced, business flow to the for-hire industry would not change, and expenditures to associated industries would not be reduced. In reality, some individual behavior changes would be expected, such as fishing for other species or cancellation of fishing trips. Substituting other species for grouper would reduce the economic losses associated with reduction in grouper harvests, whereas canceled trips would result in additional economic losses not captured in the current analysis. However, current data are insufficient to capture these behavioral responses. It is, therefore, unknown what the net effect of any behavioral responses would be.

The economic values per fish were applied to the reductions in harvest expected with each alternative. The approach used to estimate harvest reduction for this analysis followed the methods used in Strelcheck (2005a) and Brooks (2003, 2004) to calculate expected harvest changes with MRFSS data. Specifically, each MRFSS intercept trip in 2003 and 2004 was subjected to the alternative policies and the change in expected keep was recorded for red grouper, the aggregate grouper bag, and the reef fish complex.

The analysis produced estimates of the number of harvest trips affected by the red grouper bag limit, the number of harvest trips affected by the aggregate grouper bag limit, the number of target or harvest trips affected by the closed season, the combined reduction in fish kept, and the reduction in consumer surplus associated with the reduction in fish kept. The estimates of affected trips encompass multiple anglers per trip since the MRFSS intercept captures multiple anglers when harvest cannot be attributed to an individual angler. For instance, Carter (2005) reports that the average number of contributors per red grouper harvest trip intercept that targeted reef fish is 2.44. Thus, the trip estimates represent distinct fishing events but do not reflect the number of affected anglers.

The assumptions made in the analysis included:

- 1) The fishery in 2003 and 2004 accurately bound the fishery expected in 2005;
- 2) Effort does not change in response to policy changes;
- 3) Catch rates of reef fish species do not change as a result of the action rule or anglers do not value changes in catch rates (only changes in keep rates are valuable);
- 4) The value of a one fish decrease in keep is the same as the value of a one unit increase;
- 5) The value of all species included in the analysis is the same on average;
- 6) Charterboat anglers place the same value on these species as private boat anglers; and
- 7) The value of incidental (non-targeted) keep of these species is unchanged by the action.

Due to these assumptions, it is important to note that the estimated effects are appropriate measures of relative changes rather than absolute changes in the recreational fishery. Thus, although estimates of the absolute changes in fishery performance will be discussed, primary focus should be placed on the ranking of the results rather than their magnitude. The expected impacts across all harvest sectors are contained in Tables 10-13 and represent the expected

impacts under imposition of the alternative management measures for July through December 2005, or six months. Impacts by sector are presented in Tables 14-22.

Most grouper trips do not harvest either the red grouper or aggregate grouper bag limit, as demonstrated by estimated percent reductions reported in Strelcheck (2005a). A 50 percent reduction in the red grouper bag limit (from 2 fish to 1 fish) is projected to reduce red grouper harvests by only 22 percent on an annual basis, whereas combining the red grouper bag limit reduction with a 40 percent reduction in the aggregate bag limit (from 5 fish to 3 fish) is projected to reduce the harvests of other grouper by only 8.9 percent in 2005. Thus, the assumption that reducing the bag limit will not result in a change in effort is probably not true for all anglers, but is not unreasonable on average. Maintaining the same behavioral assumption for a closed season, however, is less reasonable, particularly for species like grouper that are a popular fish to eat. Therefore, under a seasonal grouper closure, while alternative fishing opportunities will remain, some trip cancellation may be expected. To gauge the potential impacts of trip cancellation, estimates of the potential foregone expenditures are provided. This information is derived from Holiman (2000), who reported that the average expenditure per trip for charterboat anglers in Florida was \$682, while the comparable figure for private/rental anglers was \$127. These estimates include, but are not limited to, expenditures on travel, lodging, food and beverage, gear, and charter or rental fees, where appropriate. The estimates also represent the average across multiple and single-day fishing trips. Additionally, expenditures on charterboat fees are examined, based on an average of \$103 per charter angler (Holiman, 2000). These expenditure estimates per trip were combined with the estimates of affected trips provided by Carter (2005) to generate an estimate of the amount of potential foregone expenditures. These estimates are provided in Table 22. The procedure to generate these estimates underestimates the true potential foregone expenditures, while the assumption that all affected trips will be cancelled overestimates the likely true effect. The expenditure totals are underestimates of the potential foregone expenditures since the average expenditure figure is on an individual angler basis, whereas the estimate of affected trips encompasses multiple anglers per trip. Although accounted for in the estimation of reduced harvest, the estimate of total affected anglers is not available and could not be used in the estimation of potential foregone expenditures. Therefore, potential foregone expenditures are underestimated. However, assuming all affected trips will be cancelled overestimates the likely true impact of the closures since the opportunity to fish for other species still exists and many fishing trips are just one component of a multi-day vacation. The net effect of this dual under- and over-estimation is unknown. However, there is no information to suggest that the rates of anglers/contributors per trip vary across the alternatives, thus, the use of trips as a proxy for anglers, while affecting the magnitude of the estimates, should not affect the ranking of the competing alternatives.

Since the completion of Carter (2005), alternatives to increase the red grouper minimum size limits were developed and constitute **Action 1, Alternative 5a and 5b**. The assessment of the expected impacts of **Alternative 5** combines the value of a saved fish derived from Carter (2005) with the estimate of fish saved under the alternative size limit scenarios to generate an estimate of the economic impacts associated with these alternatives.

4.3.1 Action 1: Red Grouper Harvest Reduction Alternatives

The assessment assumed that all bag limits are strictly followed. Since bag limits are exceeded on some trips, the assessment of **Alternative 1** indicates that harvest reduction would result if there were complete compliance with existing limits. This harvest reduction is estimated to range from approximately 9,200-16,600 fish, valued at \$38,000-\$69,000 in consumers surplus (Table 10). Strict adherence to the red grouper bag limit is estimated to impact 483-3,721 trips.

Continued fishing under status quo regulations is expected to result in red grouper harvest exceeding the recreational target catch level, 1.25 mp GW. While harvests may not continue at 2004 levels, 3.10 mp GW, they are expected to remain at least as high as the 2003 harvest of 1.35 mp GW. Continued overages have the potential to jeopardize the recovery of red grouper, requiring deviation from the rebuilding plan, more restrictive management measures, and delay in greater harvest allowances that would be possible as the stock is rebuilt. More restrictive management would be expected to result in reduced harvests, reduced value per trip, and potentially reduced numbers of trips. A reduction in trips would result in a reduction in associated expenditures through the fishery and associated industries. This would reduce the overall current and future economic value of the fishery. Changes in fishing patterns may increase pressure on other stocks and may lead to additional adverse economic consequences should harvest of these stocks exceed allowable limits. These indirect impacts cannot be forecast at this time.

In summary, **Alternative 1** would be expected to result in continued recreational red grouper harvest overages, leading to deviation from the red grouper rebuilding plan, more restrictive management, and delay of future increased benefits expected to accrue to rebuilt stocks.

Alternative 2 is expected to reduce recreational red grouper harvests by approximately 21,000-43,000 fish, valued at \$86,000-\$117,000 in consumer surplus (Table 10). Approximately 61-67 percent of the impacts would be borne by the private/rental angler sector. These results are approximately \$48,000-\$108,000 more than **Alternative 1** (Table 11). The reduced red grouper bag limit is expected to affect 7,000-8,000 more trips than **Alternative 1**. Thus, the short-term adverse economic impacts of **Alternative 2** would be greater than those of **Alternative 1**. The increased harvest savings, however, should reduce the jeopardy to the red grouper rebuilding plan, thereby reducing the severity of more restrictive management and delayed rebuilding that may be required, and reduction of the accompanying adverse economic impacts.

Alternative 3 is expected to reduce harvests by approximately 57,000-259,000 fish, valued at \$235,000-\$1.025 million in consumer surplus (Table 10). Approximately 54-71 percent of the impacts would be borne by the private/rental angler sector. These results are approximately \$197,000-\$957,000 more than **Alternative 1** (Table 11). In addition to the lower red grouper bag limit, the closed seasons are expected to affect 78,000-374,000 more trips than **Alternative 1**. **Preferred Alternative 3c** is expected to produce the least short-term impacts on consumer surplus. Although all affected trips are not expected to be cancelled, since fishing for alternative species would still be possible, if all affected trips were cancelled during the closed months, foregone expenditures associated with these trips would range from \$11.87 million (Table 22, **Preferred Alternative 3c**, 2003 conditions) to \$64.59 million (**Alternative 3d**, 2003

conditions). Across both years, **Preferred Alternative 3c** would average \$11.93 million in potential foregone expenditures.

When examined by sector, **Preferred Alternative 3c** would produce the least adverse impact for the charterboat sector, a reduction in value of \$99,000, if the 2005 fishery is like that of the 2003 fishery, or \$151,000, if the fishery is more like that of 2004 (Table 14). The potential foregone expenditures associated with the affected charterboat trips during the respective closures range from \$2.23 million (Table 22, **Preferred Alternative 3c**, 2004 conditions) to \$20.96 million (**Alternative 3d**, 2003 conditions). Charterboat fees alone are estimated at \$337,000 and \$3.17 million for these two alternatives, respectively. For the private/rental sector, the respective alternatives are **Preferred Alternative 3c** (\$136,000 in reduced consumer surplus, Table 18) under 2003 conditions and **Alternatives 3a** or **3b** (\$374,000) under 2004 conditions (the absence of target intercepts in the private/rental mode that retained aggregate grouper in September 2004 resulted in identical results in the assessment process for these two alternatives). The potential foregone expenditures associated with the affected trips in this sector during the respective closures range from \$9.53 million (Table 22, **Preferred Alternative 3c**, 2003 conditions) to \$43.63 million (**Alternative 3d**, 2003 conditions). Over both years, **Preferred Alternative 3c** has the lowest average potential foregone expenditures for each sector, \$2.29 million in the charterboat sector and \$9.64 million in the private/rental sector. The next lowest total is **Alternative 3a** at \$6.36 million and \$18.2 million for the two sectors, respectively.

Since **Alternative 3** also includes the 1-fish red grouper bag limit proposed by **Alternative 2**, the impacts of all the closure alternatives exceed those of **Alternative 2**, and exceed the short term adverse impacts of **Alternative 1**. The increased harvest savings attributed to the closure, however, should further reduce the jeopardy to the red grouper rebuilding plan, thereby reducing the adverse impacts of more restrictive management and delayed rebuilding, and increasing benefits from an improved stock condition.

Alternative 4 is expected to reduce harvests by approximately 180,000-312,000 fish, valued at \$686,000-\$1.235 million in consumer surplus (Table 10). Approximately 61 percent of the impacts would be borne by the private/rental angler sector. These results are approximately 171,000-296,000 more fish, valued at \$648,000-\$1.166 million more than **Alternative 1** (Table 11). The closed season is expected to affect 438,000-481,000 more trips than **Alternative 1**. Since **Alternative 4** does not include a red grouper bag limit change from the status quo, the expected impacts of **Alternative 4** associated with the red grouper bag limit are identical to those of **Alternative 1**. The impacts of **Alternative 4** exceed the impacts of **Preferred Alternative 3c** (Table 10). Should all affected trips be cancelled, potential foregone expenditures are estimated to range from \$75.35 million to \$85.23 million (Table 22). By sector, expenditures in the charterboat sector range from \$24.22 million to \$29.7 million, or an average of \$26.96 million, and \$3.66 million to \$4.48 million in charterboat fees. For the private/rental sector, potential foregone expenditures range from \$51.13 million to \$55.53 million, or an average of \$53.33 million. Potential foregone expenditures under **Alternative 4** are, on average six times greater than those under **Preferred Alternative 3c**.

Of all the alternatives in Action 1, the adverse economic impacts of **Alternative 4** are the greatest, on average, although the reduction in consumer surplus for **Alternative 4** under 2003

fishing performance is less than that of **Alternative 3d** under 2004 fishing conditions (Table 10). This results from the greater reduction, on average, of harvest that would be expected under **Alternative 4**. As such, **Alternative 4** would be expected to have the greatest potential of returning the fishery to the rebuilding plan. However, the harvest reductions are likely greater than is necessary as an interim measure. Therefore, **Alternative 4** would be expected to result in greater short-term adverse economic impacts than are necessary to achieve the management goals.

Alternative 5a is projected to result in a reduction in red grouper harvests of approximately 92,000 fish, valued at \$292,000, whereas the comparable estimates for **Alternative 5b** are 121,000 fish and \$383,000 (Table 10). These values exceed those of **Alternative 1** by 79,000 fish at \$239,000 and 108,000 fish at \$330,000, respectively (Table 11). The average estimated reduction in consumer surplus under **Alternative 5a** is less than the average reductions under **Preferred Alternative 3c** (\$292,000 compared to \$334,000), and the reduction in consumer surplus under **Alternative 5b** is less than that of **Preferred Alternative 3c** under 2004 conditions (\$383,000 compared to \$432,000). However, the release mortality associated with the release of additional undersized fish may negate the benefits of the reduced harvests, thereby reducing the necessary progress toward returning to the rebuilding path and not avoiding more restrictive management and accompanying adverse economic impacts. Similar concern is not as great under bag and seasonal adjustments since there is a greater expectation that targeted fishing will cease upon reaching the bag limit, and directed fishing will be reduced under seasonal closures, thereby reducing catch and release activity. Increased minimum size limits, conversely, directly affect the ability to reach the bag limit, inducing increased catch and release behavior. Thus, the net adverse economic impacts of **Alternative 5** are expected to be greater than those of **Preferred Alternative 3c**.

4.3.2 Action 2: Aggregate Bag Limit Alternatives

The following discussion presents the expected impacts of each of the four alternatives under Action 2 as stand-alone alternatives, encompassing only bag limit changes, as well as in combination with each of the closure alternatives contained in **Action 1, Alternative 3**. Thus, although this action formally includes only four alternatives, the following discussion designates the combination of the aggregate grouper bag limit reduction with the various seasonal closure alternatives through the addition of the alphabetical ordering established in **Action 1, Alternative 3**. Thus, the discussion and tables will include references to **Alternatives 2a-d, 3a-d, and 4a-d**.

The expected impacts of **Alternative 1** (status quo) are identical to those of **Action 1, Alternative 1** and are included herein by reference.

Alternative 2 is expected to reduce harvests by approximately 25,000-262,000 fish, valued at \$103,000-\$1.038 million in consumer surplus (Table 12). Approximately 46-69 percent of the impacts would be borne by the private/rental angler sector. These results are approximately 16,000-246,000 more fish, valued at \$65,000-\$969,000 more than **Alternative 1** (Table 13). The reduced aggregate grouper bag limit is expected to affect approximately 450-2,040 more trips than **Alternative 1**, while the closed seasons are expected to affect 145,000-374,000 more trips.

The results mimic those of Action 1 in that the impacts of **Alternative 2a** and **Alternative 2c** are similar, despite the substantially longer closure under **Alternative 2c**. As would be expected, the combined effects of the more severe bag limit reduction and closure period result in the impacts of **Alternative 2d** being the most severe.

Assuming a seasonal closure is imposed, when evaluated by sector, the impact results mirror those of **Action 1**, **Alternative 2** in that the impacts vary by sector. **Alternative 2c** would produce the least adverse impact for the charterboat sector, a \$111,000 reduction in consumer surplus if the 2005 fishery is like that of 2003 or \$162,000 reduction in consumer surplus, if the fishery is like that of 2004 (Table 16). For the private/rental sector, the respective alternatives impacts are \$136,000 under 2003 conditions and \$308,000 under 2004 conditions for **Alternative 2c** (Table 20).

The reduction in the aggregate bag limit on top of the reduction in the red grouper bag limit may provide some protection to other grouper species from redirected red grouper effort, as well as reduce bycatch and subsequent mortality of red grouper, assuming anglers cease fishing upon reaching the limit. The economic impacts of this cannot be assessed since it cannot be forecast how much redirection might otherwise occur and what impact this may have on these species. The reduction in the aggregate bag limit should not eliminate the mitigation benefits of all substitution, but could prevent excessive new pressure on substitute species. Avoidance of excessive pressure on these alternative species and the additional management measures that might otherwise be required would eliminate any reduction of benefits that would accrue to these fisheries.

Preferred Alternative 3 is expected to reduce harvests by approximately 32,000-266,000 fish, valued at \$131,000-\$1.054 million in consumer surplus (Table 12). Approximately 40-67 percent of the impacts would be borne by the private/rental angler sector. These results are approximately 22,000-250,000 more fish, valued at \$93,000-\$986,000 more than **Alternative 1** (Table 13). The number of trips affected by the reduced aggregate grouper bag limit ranges from approximately 2,700-3,700 trips, while the closed seasons are expected to affect 145,000-374,000 more trips than **Alternative 1**. As would be expected, the combined effects of the more severe bag reduction and closure period result in the impacts of **Alternative 3d** being the most severe.

Assuming a seasonal closure is imposed, when evaluated by sector, the results of these alternatives mirror those of **Action 1** **Alternative 2** in that the impacts vary by sector. **Alternative 3c** would produce the least adverse impact for the charterboat sector, a reduction in value of \$30,000, if the 2005 fishery is like that of the 2003 fishery, or \$47,000, if the fishery is more like that of 2004 (Table 16). For the private/rental sector, **Alternative 3c** similarly produces the least adverse impacts, \$140,000 under 2003 conditions and \$341,000 under 2004 conditions (Table 20).

Similar to **Alternative 2**, the reduction in the aggregate bag limit under **Preferred Alternative 3** may provide protection to other grouper species from redirected red grouper effort, as well as reduce bycatch and subsequent mortality of red grouper, assuming anglers cease fishing upon reaching the bag. Since the reduction in the aggregate limit is greater for this alternative than

Alternative 2, the potential protection is greater. However, the greater the reduction, the more anglers are limited in substituting other grouper species for reductions in red grouper harvests and the opportunity for mitigating the impacts of the reduced red grouper bag limit is reduced. Further, at some point, the protection of these other species may be greater than is necessary, given natural availability and ability or tendency to catch these species (a stock may be able to biologically support a 4-fish limit, yet be subjected to a 3-fish limit). Thus, foregone benefits may be incurred. The point at which this becomes the case, however, has not been determined.

Alternative 4 is expected to reduce harvests by approximately 54,000-272,000 fish, valued at \$223,000-\$1.079 million in consumer surplus (Table 12). Approximately 50-64 percent of the impacts would be borne by the private/rental angler sector. These results are approximately 45,000-256,000 more fish, valued at \$184,000-\$1.011 million more than **Alternative 1** (Table 13). Approximately 10,000 more trips than under **Alternative 1** would be affected by the reduced aggregate grouper bag limit, while the closed seasons are expected to affect 145,000-374,000 more trips. As would be expected, the combined effects of the more severe bag limit reduction and closure period result in the impacts of **Alternative 4d** being the most severe.

Assuming a seasonal closure is imposed, when evaluated by sector, the assessment results of these alternatives mirror those of **Action 1**, **Alternatives 2 and 3** in that the impacts vary by sector. **Alternative 4c** would produce the least adverse impact for the charterboat sector, a \$153,000 reduction in consumer surplus if the 2005 fishery is like that of the 2003 fishery, or a \$256,000 reduction in consumer surplus if the fishery is more like that of 2004 (Table 16). For the private/rental sector, the respective values are \$176,000 under 2003 conditions and \$390,000 under 2004 conditions, both for **Alternative 4c** (Table 20).

Similar to **Alternatives 2 and 3**, the reduction in the aggregate bag limit on top of the reduction in the red grouper bag limit may provide some protection to other grouper species from redirected red grouper effort, as well as reduce bycatch and subsequent mortality of red grouper, assuming anglers cease fishing upon reaching the limit. Since the reduction in the aggregate limit is greater for this alternative, the potential protection is greater. However, the greater the reduction, the more anglers are limited in substituting species and mitigating the impacts of the reduced red grouper bag limit. As discussed under **Alternative 3**, at some point the protection of these other species may be more than is necessary and the potential for foregone benefits exists.

4.4 Direct and Indirect Effects on the Social Environment

4.4.1 Action 1: Red Grouper Harvest Reduction Alternatives

Under **Alternative 1 (status quo)**, no immediate changes would occur in the fishery and, therefore, all business and social patterns could continue unchanged in the short term. However, continued fishing under the status quo is expected to result in red grouper harvest exceeding the recreational target catch level. Continued overages have the potential to jeopardize the recovery of red grouper, precipitating deviation from the rebuilding plan, more restrictive management measures, and delay in more liberal harvest allowances that would be possible as the stock is rebuilt. This would be expected to result in reduced harvests, reduced value per trip, and potentially reduced trips. Reduced trips would result in reduced expenditures flowing through

the fishery and associated industries. The impacts of these reduced expenditures would be expected to be felt in both directly associated industries, such as marinas, bait and tackle shops, and food suppliers and lodging, as well as other businesses in the community that employees in the directly associated industries patronize. The overall reduction in the current and future economic value of the fishery would, therefore, be expected to induce adverse impacts throughout the communities where the fisheries occur.

The ability to adapt to the diminished economic environment created by the reduction in the value of the fishery is influenced by the diversity of fishing and other employment alternatives. Fisheries are heavily regulated and the flexibility to shift from one to another is increasingly limited. Further, often the communities associated with the fishery lack sufficient diversity to offer substitute employment opportunities. This increases the severity of the adverse social impacts that would be expected to ensue.

Alternative 2 is expected to reduce the magnitude of the harvest overages expected to occur under the status quo (**Alternative 1**), thus inducing some immediate harvest reductions, with associated reductions in angler value, yet reducing the severity of corrective action that would be required should harvest overages be allowed to continue unabated for a longer period of time. Therefore, the severity of the social impacts that would be expected in the longer term under the status quo would be reduced.

Although this alternative is expected to result in reduced value or pleasure associated with the fishing experience, no changes in fishing behavior is expected. Thus, expenditure patterns through the fishery and associated industries are expected to continue largely unchanged. Therefore, employment patterns, income and expenditure flow, lifestyle patterns, community interactions, etc. should remain largely unaffected.

With regards to the impacts associated with the bag limit reduction, the expected social impacts of **Alternative 2** and **Alternative 3** are identical. Unlike reduced bag limits, however, **Alternative 3** increases the possibility of behavioral changes by anglers. Specifically, while it is assumed that the proposed red grouper bag limit reduction will not induce cancelled fishing trips, the grouper closures increase the probability that anglers will select alternative recreational activities and cancel their fishing trip. As stated above, the potential foregone expenditures as a result of cancelled trips could be in excess of \$64 million. The loss of these expenditures may jeopardize the business viability of some enterprises and associated industries, creating stress in both business and social relationships and additional burdens on social structures and support services. Among the closure options, **Preferred Alternative 3c** is projected to result in the lowest potential foregone expenditures and, thus, should induce the least adverse social impacts. Further, the additional harvest reduction accomplished by a closure would be expected to reduce the severity of future corrective action required in response to delayed return to the rebuilding plan, thus, reducing the adverse social impacts that would be expected to accrue to this corrective action.

The expected social impacts of **Alternative 4** are expected to be similar to the closure impacts associated with **Alternative 3**, only more severe since the closure period would be longer. While the likelihood of further corrective action is substantially decreased under this alternative,

the expected harvest reductions are greater than necessary, thus inducing not only the social impacts associated with potential lost business, but also the perception of excessive and irresponsible management. This may precipitate additional adverse social and economic behaviors such as refusal to cooperate with the management process and legal challenges.

The expected social impacts of **Alternative 5** are similar to those of **Alternative 2** since the regulatory change is expected to reduce red grouper harvest, yet fishing effort is expected to remain largely unchanged. However, the additional mortality associated with the increased release may substantially reduce the progress towards returning the fishery to the rebuilding plan. Thus, avoidance of more severe corrective action and accompanying adverse social impacts may be reduced. Additionally, minimum size limits are increasingly viewed with skepticism by the angling public, particularly for species subject to high release mortality, as is stated to be the case for groupers due to the depths at which they are hooked and the difficulties associated with their air bladder and subsequent return to the bottom. Thus, increasing the minimum size could precipitate substantial negative response from the fishery and conservation sectors, resulting in protracted management deliberation, non-compliance, and legal challenges.

4.4.2 Action 2: Aggregate Bag Limit Alternatives

Similar to **Action 1, Alternative 1**, under the status quo, no immediate changes would occur in the fishery and, therefore, all business and social patterns could continue unchanged in the short term. However, status quo management of the aggregate grouper fishery in conjunction with more restrictive red grouper management could allow both increased mortality of red grouper as bycatch and result in increased pressure on other aggregate grouper species if anglers shift target behavior. This has the potential of more restrictive management measures in the future on both the red grouper and aggregate grouper fisheries. This would be expected to result in reduced harvests, reduced value per trip, and potentially reduced trips and associated expenditures through the fishery and associated industries. Resultant impacts would be expected to be felt in both directly associated industries, such as marinas, bait and tackle shops, and food suppliers and lodging, as well as other businesses in the community that employees in the directly associated industries patronize. The overall reduction in the current and future economic value of the fishery would, therefore, be expected to induce adverse social impacts throughout the communities where the fisheries occur.

Alternative 2 is expected to reduce the potential of increased red grouper bycatch mortality and pressure on other grouper species, thereby reducing the severity of future corrective action. Therefore, the severity of the social impacts that would be expected in the longer term under the more severe corrective action that would be expected under the status quo would be reduced.

Although this alternative is expected to result in reduced value or pleasure associated with the fishing experience, changes in fishing behavior are expected to be small since the reduction is only expected to reduce aggregate grouper harvests by 6.5 percent (Table 4; Strelcheck 2005a). Thus, expenditure patterns through the fishery and associated industries are expected to remain unchanged or would only be slightly reduced. This would be expected to have little effect on employment patterns, income and expenditure flow, lifestyle patterns, and community interactions. However, if combined with a closure option under **Action 1, Alternative 3**, social

impacts associated with the closure would be expected to occur, as discussed in Section 4.3.1. These impacts are incorporated herein by reference.

Preferred Alternative 3 is expected to result in the same impacts described for **Alternative 2**. These impacts are incorporated herein by reference. The aggregate bag limit under this alternative represents a 40 percent reduction from the status quo. Although the aggregate grouper harvest reduction under the lower limit is expected to be only 8.9 percent (Table 4; Strelcheck 2005a), some portion of those anglers who routinely take the current limit may decide to change their fishing patterns. The magnitude and resultant social impacts of this behavior cannot be determined at this time. Nevertheless, the potential of this should be acknowledged.

Alternative 4 is expected to result in the same impacts described for **Alternative 2** and **Preferred Alternative 3**. These impacts are incorporated herein by reference. Since the aggregate bag limit under this alternative represents a 60 percent reduction from the status quo and a projected 13.5 percent reduction in aggregate grouper harvest (Table 4; Strelcheck 2005a), the potential for behavioral and effort change increases over that of **Preferred Alternative 3** and **Alternative 2**.

4.5 Direct and Indirect Effects on the Administrative Environment

4.5.1 Action 1: Red Grouper Harvest Reduction Alternatives

Alternative 1 (status quo) would maintain status quo regulations, which include a two red grouper bag limit and a 20-inch minimum size limit. The MRFSS and the SEFSC's Headboat Survey monitor recreational landings. Monitoring recreational landings and enforcing bag and size limits burden the administrative environment. However, such administrative activity falls within the scope of routine fishery management actions.

Alternatives 2-4 would establish interim regulations presumably beginning in July 2005. These interim actions would be effective for a maximum of 360 days (180 days + one additional 180 day extension) and represent an administrative burden that is part of the normal administrative activities of NMFS. An amendment to the Reef Fish FMP would be required to institute permanent regulations. The Council is currently working on a regulatory amendment that will consider establishing closed seasons for grouper and changing the red grouper bag limit and aggregate bag limit.

Alternatives 2-4 would not change how landings were monitored and therefore would not represent an additional administrative burden for MRFSS or the SEFSC's headboat survey. **Alternative 2** would reduce the bag limit to one. The lower red grouper bag limit could reduce the burden on enforcement by making it easier and faster to determine compliance with regulations (less fish to count and measure). However, if less people comply with the lower bag limit, then the burden on enforcement would be increased. This alternative would represent an additional burden for NMFS, because regulations would have to be published and the public would have to be informed of the interim regulations, including potential extension of the interim regulations.

Similar to **Alternative 2**, **Alternative 3** may reduce the burden on enforcement by making it easier and faster to determine compliance with regulations. Closed seasons are used to regulate recreational red snapper and several commercial fisheries, and therefore enforcing closures is part of the normal administrative activities of law enforcement. Although a closed season would represent an additional regulation to enforce, a closure may reduce the overall burden on enforcement by making it simpler to determine whether or not anglers are complying with regulations (either you possess grouper during the closure or you do not possess grouper during the closure). The administrative burden would also be greater for **Alternatives 3a-3d** than **Alternatives 1** or **2**, because additional notices would have to be prepared to notify the public of both the red grouper bag limit reduction and a closed season.

Alternative 4 would close the grouper fishery from July 1 to December 31, 2005. This alternative would represent an additional regulation to enforce. As discussed above, a closed season could reduce the burden on enforcement by making it simpler to determine whether or not anglers are complying with regulations. Unlike **Alternatives 2** or **3**, **Alternative 4** would result in less of a burden to law enforcement because they would not have to count or measure fish to determine compliance with bag and size limits. However, if non-compliance is higher during the closed season, the burden on enforcement could be increased. Implementation of a six-month closure would require NMFS to notice when the closure would begin and end.

Alternative 5 would increase the minimum size limit for red grouper. This alternative would not result in any additional regulations to enforce. Minimum size limits are commonly used to control harvest in recreational fisheries. If the higher minimum size limits increase the rate of non-compliance, the burden on law enforcement would be increased. **Alternatives 5a-b** would present an additional burden for the NMFS, because the new size limit would have to be noticed.

4.5.2 Action 2: Aggregate Bag Limit Alternatives

Alternative 1 would maintain the current aggregate bag limit of five grouper. This alternative would not increase the burden on the administrative environment and would not change how landings are monitored. **Alternatives 2-4** would reduce the aggregate bag limit to 4, 3 or 2 fish. Each of these alternatives would increase the administrative burden by requiring NMFS to notice the interim regulations. Reductions to the aggregate bag limit could positively benefit enforcement by making it easier to determine compliance with regulations (less fish to count and measure). However, lower aggregate bag limits could result in higher non-compliance and increase the administrative burden. If lower aggregate bag limits are combined with a lower red grouper bag limit and/or closed seasons, the administrative burden would potentially be increased if these interim regulations increase non-compliance.

4.6 Mitigation Measures

The proposed action will adversely affect short-term consumer surplus of some recreational anglers in the Gulf of Mexico and may result in fishing trip cancellation, reducing expenditures to the fishery and associated industries. These adverse effects, however, are expected to be less than the impacts associated with more restrictive management measures that would potentially be required if the current recreational harvest overages, as projected under the status quo, are not

arrested and the fishery allowed to return to the rebuilding plan. Therefore, no mitigation measures are proposed for any of these alternatives.

4.7 Cumulative Effects

Section 1508.7 defines cumulative impacts as impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. The proposed action stems from the regulatory actions implemented by Secretarial Amendment 1 (NOAA Fisheries 2004a), which implemented a rebuilding plan, a two-fish bag limit, and a commercial quota for red grouper. The amendment's purpose was to eliminate overfishing of red grouper by reducing harvest by 9.4 percent.

Commercial landings during the first two years of the red grouper rebuilding plan were less than the commercial quota. In 2004, the commercial fishery was closed on November 15th just prior to reaching the commercial quota in order to maintain landings at levels below the commercial quota of 5.31 mp GW. In contrast, recreational landings exceeded the recreational target catch level during both 2003 and 2004. The actions proposed herein would reduce the likelihood that the recreational sector will exceed their share of the ABC in 2005. By reducing recreational harvest, the cumulative effect of maintaining ABC within or near levels specified by the rebuilding plan will have a positive benefit on the long-term productivity of the stock.

The actions proposed herein could also have positive biological benefits for other groupers by reducing fishing pressure and fishing mortality. Because red grouper are part of a multispecies fishery and co-occur with several other grouper, management regulations that apply to the entire grouper fishery would reduce bycatch and landings of all groupers. Gag, which is the primary grouper species harvested by recreational anglers, is not overfished or undergoing overfishing, but is considered fully utilized. Reductions in fishing mortality on gag could benefit the stock, although the cumulative benefits of reducing harvest could result in lost yield.

The proposed action will result in negative economic effects, in addition to the effects of Secretarial Amendment 1. Cumulatively, the economic effects will result in losses in consumer surplus for some recreational anglers and reduced expenditures to the fishery and associated industries. However, these effects are expected to be less than the impacts associated with more restrictive management measures that would potentially be required if the current recreational harvest overages are not arrested and the fishery allowed to return to the rebuilding plan.

The effects of this action are also expected to extend into the future. Because this is an interim regulation, the actions proposed are effective for 180 days, unless extended by an additional 180 days. The Council is currently developing a regulatory amendment for red grouper and other groupers. This regulatory amendment could establish similar management measures to reduce recreational red grouper harvest as those proposed herein. Therefore, the biological benefits of this action would be continued by the regulatory amendment.

The Council and NMFS have also recently approved or are developing amendments to the Reef Fish FMP, which when considered with this action could result in additional cumulative biological and economic effects. Amendment 23 implemented recreational and commercial

management measures to reduce vermilion snapper harvest and rebuild the fishery. Amendment 17/25 proposes to extend the moratorium on for-hire reef fish and CMP for-hire permits. Amendment 26 would establish an IFQ program for the commercial red snapper fishery. In addition to these Council amendments, a voluntary buyback program for the commercial grouper fishery has been proposed by industry to reduce latent effort and increase the economic viability of vessels remaining in the fishery. These actions and their corresponding regulations have various objectives, including rebuilding overfished stocks, maintaining caps on effort, reducing effort, and improving economic efficiency. The details of many of these future actions are still highly uncertain and will be analyzed in greater detail when the Council and NMFS considers these actions in the future. In general, these actions in conjunction with the actions proposed herein, would likely result in positive benefits to the biological environment by accomplishing the objectives stated above. Economic losses from these actions in the short-term are expected to be less than the cumulative benefits of rebuilding stocks and improving economic conditions and efficiency in the long-term.

4.8 Unavoidable Adverse Effects

All alternatives have small, and likely negligible effects on the physical environment. Depending on the level harvest is reduced, alternatives other than status quo would all benefit the biological environment to varying degrees. Unavoidable adverse effects on the administrative environment are the result of additional regulations for enforcement and providing notice of interim regulations (see Section 4.5). Adverse economic and social effects will result from this proposed action, and are described in sections 4.3 and 5.0. However, these unavoidable adverse effects are expected to outweigh the effects of allowing overfishing to continue.

4.9 Relationship Between Short-Term Uses and Long-Term Productivity

The relationship between short-term uses and long-term productivity will be affected by this action. This action would restrict the harvest of grouper in the short-term. However, reductions in harvest are expected to benefit the long-term productivity of red grouper and other groupers. Red grouper are currently being rebuilt and reducing harvest will increase the likelihood that red grouper will be rebuilt within the timeframe specified in Secretarial Amendment 1 to the Reef Fish FMP.

4.10 Irreversible and Irretrievable Commitments of Resources

Irreversible commitments are defined as commitments that cannot be reversed, except perhaps in the extreme long term, whereas irretrievable commitments are lost for a period of time. This is an interim action that will last for a period 180 days, unless extended by an additional 180 days. Because of the short duration of this action, there are no irreversible commitments for this action. This action will result in irretrievable losses in consumer surplus and angler expenditures, which are described in sections 4.3 and 5.0.

4.11 Any Other Disclosures

No additional disclosures are needed or known for this action.

5.0 ECONOMIC ANALYSIS

5.1 Introduction and Background

Due to the nature of the action and the acute time frame in which it must be promulgated, the following analysis will not cover the full breadth and depth of the requirements of a Regulatory Impact Review, Social Impact Assessment, or a Regulatory Flexibility Act Analysis. However, the analysis will address the primary assessment requirements of each.

The proposed action and alternatives are:

Action 1: Red Grouper Management Measures

Alternative 1: No action (status quo): The recreational bag limit for red grouper is two fish and the minimum red grouper size limit is 20 inches total length.

Alternative 2: Reduce the recreational red grouper bag limit from 2 to 1 fish.

Alternative 3: Reduce the recreational red grouper bag limit from 2 to 1 fish and establish a closed season for all groupers during:

- a) October – December.
- b) September – December.

Preferred --> c) November – December.
e) August – November.

Alternative 4: Establish a six-month closed season (July – December) for the recreational harvest of grouper.

Alternative 5: Increase the recreational red grouper minimum size limit from 20 inches TL to:
a) 22 inches TL.
b) 23 inches TL.

Action 2: Aggregate Grouper Bag Limit

Alternative 1: No action (status quo): The aggregate grouper bag limit is 5 fish.

Alternative 2: Reduce the aggregate grouper bag limit from 5 to 4 fish.

Preferred ---> **Alternative 3:** Reduce the aggregate grouper bag limit from 5 to 3 fish.

Alternative 4: Reduce the aggregate grouper bag limit from 5 to 2 fish.

5.2 Description of the Reasons Why Action by the Agency Is Being Considered

The purpose and need for the action is contained in Section 1.3 and is incorporated herein by reference. In summary, this action is intended to reduce the expected harvest overages in the

recreational red grouper fishery, reduce the likelihood of overfishing, and avoid the more severe corrective action that would be required if return of the fishery to its rebuilding path is delayed. This action is also intended to prevent or minimize biological impacts on gag and other groupers resulting from shifts in effort due to red grouper management actions, and minimize or reduce the social and economic impacts expected to result from any interim regulations, while still achieving the biological objectives.

5.3 Statement of the Objectives of and Legal Basis for the Proposed Rule

The objective of this action is to eliminate the harvest overages that have occurred in the recreational red grouper sector, thereby returning the fishery to its rebuilding plan and reducing the adverse socio-economic effects that would accrue to more severe corrective action and rebuilding delay. The MSFCMA, as amended, provides the legal basis for the rule.

5.4 Description of the Fishery

The description of the fishery and the communities it supports is contained in Section 3.3 and Section 3.4 and is incorporated herein by reference.

5.5 Description of the Projected Reporting, Record-keeping and Other Compliance Requirements of the Interim Rule, Including an Estimate of the Classes of Small Entities Which Will be Subject to the Requirement and the Type of Professional Skills Necessary for the Preparation of the Report or Records

The interim rule will not impose any new reporting requirements. Anglers in the Gulf reef fish fishery currently do not have any licensing or reporting requirements. For-hire vessels that participate in the fishery are required to have a valid permit and participate in the for-hire effort data collection program if selected. Additionally, headboats are required to submit logbook reports to the SEFSC Headboat Survey program. The interim rule will not alter these requirements. All information elements required for both permit application/renewal and the logbook program are standard elements essential to the successful operation of the business and should already be collected and maintained as standard operating practice by the business. These requirements do not require professional skills, and, therefore, may be deemed not to be onerous on the affected participants.

5.6 Identification of All Relevant Federal Rules Which May Duplicate, Overlap or Conflict With the IR

No duplicative Federal rules have been identified.

5.7 Substantial Number of Small Entities

This action is expected to directly impact for-hire fishing entities in the Gulf of Mexico. This sector includes both charterboats and headboats. The Small Business Administration defines a small business in the for-hire fishery sector as a firm that is independently owned and operated, is not dominant in its field of operation, and has annual receipts up to \$6.0 million.

Consistent with the sector profiles provided in Section 3.3, all for-hire entities that participate in the fishery are assumed to be small businesses. There are approximately 1,779 vessels permitted to participate in the for-hire fishery, of which approximately 1,625 are permitted to participate in the reef fish fishery. Approximately two-thirds of these vessels are home ported in Florida, where the majority of the grouper fishery occurs. The average charterboat is estimated to generate \$76,960 in annual revenues and \$36,758 in annual profits, whereas the appropriate values for the average headboat are \$404,172 and \$338,209, respectively.

Additional entities, such as marinas, bait and gear shops, and others, may be directly affected by the proposed action. These entities and their profiles cannot be identified at this time.

Given the profiles presented, it is determined that all for-hire fishing entities that will be affected by the proposed action are small business entities. Since all said entities would be potentially affected, it is determined that the proposed action will affect a substantial number of small entities.

5.8 Economic Impacts

Detailed discussion of the expected economic impacts of the interim rule are contained in Section 4.3 and are incorporated herein by reference. A summary of the expected impacts follows.

5.8.1 Action 1: Red Grouper Harvest Reduction Alternatives

Alternative 1 (status quo) is expected to result in a reduction of red grouper harvest of approximately 9,200-16,600 fish, valued at \$38,000-\$69,000 in consumers surplus (Table 11), assuming strict adherence to the red grouper bag limit occurs. Continued fishing under status quo regulations is expected to result in red grouper harvest exceeding the recreational target catch level, 1.25 mp GW. Continued overages have the potential to jeopardize the recovery of red grouper, requiring deviation from the rebuilding plan, more restrictive management measures, and delay in greater harvest allowances that would be possible as the stock is rebuilt. More restrictive management would be expected to result in reduced harvests, reduced value per trip, and potentially reduced numbers of trips. A reduction in trips would result in a reduction in associated expenditures through the fishery and associated industries. This would reduce the overall current and future economic value of the fishery. Changes in fishing patterns may increase pressure on other stocks and may lead to additional adverse economic consequences should harvest of these stocks exceed allowable limits. These indirect impacts cannot be forecast at this time.

Alternative 2 is expected to reduce recreational red grouper harvests by approximately 21,000-43,000 fish, valued at \$86,000-\$117,000 in consumer surplus (Table 11), or approximately 12,000-26,000 fish, valued at \$48,000-\$108,000 more than **Alternative 1** (Table 12). Thus, the short-term adverse economic impacts of **Alternative 2** would be greater than those of **Alternative 1**. The increased harvest savings, however, should reduce the jeopardy to the red grouper rebuilding plan, thereby reducing the severity of more restrictive management and

delayed rebuilding that may be required, and reduction of the accompanying adverse economic impacts. The bag limit reduction is not expected to reduce fishing effort, nor result in substantial redirection of fishing effort. Since fishing behavior is expected to remain largely unchanged, little increased pressure on alternative stocks is expected. Although some redirection of effort may occur, since reduced red grouper harvests are not that large relative to total red grouper harvests, any redirection is not expected to create deterioration of fishing conditions for these alternative species and, thus, not induce economic losses in these fisheries.

Alternative 3 is expected to reduce harvests by approximately 57,000-259,000 fish, valued at \$235,000-\$1.025 million in consumer surplus (Table 10), or approximately 47,000-243,000 more fish, valued at \$197,000-\$957,000 more than **Alternative 1** (Table 11). Among the closure alternatives under **Alternative 3**, **Preferred Alternative 3c** is expected to produce the least short-term impacts on consumer surplus. Although all affected trips are not expected to be cancelled, since fishing for alternative species would still be possible, if all affected anglers cancel their fishing trips during the closed months, foregone expenditures associated with these trips would range from \$11.87 million (Table 22, **Preferred Alternative 3c**, 2003 conditions) to \$64.59 million (**Alternative 3d**, 2003 conditions). Across both years, **Preferred Alternative 3c** would average \$11.93 million in potential foregone expenditures.

Preferred Alternative 3c would produce the least adverse impact for the charterboat sector, a reduction in value of \$99,000, if the 2005 fishery is like that of the 2003 fishery, or \$151,000, if the fishery is more like that of 2004 (Table 14). The potential foregone expenditures associated with the affected charterboat trips during the respective closures range from \$2.23 million (Table 22, **Preferred Alternative 3c**, 2004 conditions) to \$20.96 million (**Alternative 3d**, 2003 conditions). Charterboat fees alone are estimated at \$337,000 and \$3.17 million for these two alternatives, respectively. For the private/rental sector, the respective alternatives are **Preferred Alternative 3c** (\$136,000 in reduced consumer surplus, Table 18) under 2003 conditions and **Alternatives 3a** or **3b** (\$374,000) under 2004 conditions. The potential foregone expenditures associated with the affected trips in this sector during the respective closures range from \$9.53 million (Table 22, **Preferred Alternative 3c**, 2003 conditions) to \$43.63 million (**Alternative 3d**, 2003 conditions). Over both years, **Preferred Alternative 3c** has the lowest average potential foregone expenditures for each sector, \$2.29 million in the charterboat sector and \$9.64 million in the private/rental sector. The next lowest total is **Alternative 3a** at \$6.36 million and \$18.2 million for the two sectors, respectively.

Alternative 4 is expected to reduce harvests by approximately 180,000-312,000 fish, valued at \$686,000-\$1.235 million in consumer surplus (Table 10), or approximately 171,000-296,000 more fish, valued at \$648,000-\$1.166 million more than **Alternative 1** (Table 12). Should all affected trips be cancelled, potential foregone expenditures are estimated to range from \$75.35 million to \$85.23 million (Table 22). By sector, expenditures in the charterboat sector range from \$24.22 million to \$29.7 million, or an average of \$26.96 million, and \$3.66 million to \$4.48 million in charterboat fees. For the private/rental sector, potential foregone expenditures range from \$51.13 million to \$55.53 million, or an average of \$53.33 million. Potential foregone expenditures under **Alternative 4** are, on average, five times or greater than those under **Preferred Alternative 3c**.

Of all the alternatives in Action 1, the adverse economic impacts of **Alternative 4** are the greatest, on average (Table 10) due to the greater reduction, on average, of harvest that would be expected under **Alternative 4**. As such, **Alternative 4** would be expected to have the greatest potential of returning the fishery to the rebuilding plan. However, the harvest reductions are likely greater than is necessary as an interim measure. Therefore, **Alternative 4** would be expected to result in greater short-term adverse economic impacts than are necessary to achieve the management goals.

Alternative 5a is projected to result in a reduction in red grouper harvests of approximately 92,000 fish, valued at \$292,000, whereas the comparable estimates for **Alternative 5b** are 121,000 fish and \$383,000 (Table 10), or 79,000 fish at \$239,000 and 108,000 fish at \$330,000, respectively more than **Alternative 1** (Table 11). The average estimated reduction in consumer surplus under **Alternative 5a** is less than the average reductions under **Preferred Alternative 3c** (\$292,000 compared to \$334,000), and the reduction in consumer surplus under **Alternative 5b** is less than that of **Preferred Alternative 3c** under 2004 conditions (\$383,000 compared to \$432,000). However, the release mortality associated with the release of additional undersized fish may negate the benefits of the reduced harvests, thereby reducing the necessary progress toward returning to the rebuilding path and not avoiding more restrictive management and accompanying adverse economic impacts. Similar concern is not as great under bag and seasonal adjustments since there is a greater expectation that targeted fishing will cease upon reaching the bag limit, and directed fishing will be reduced under seasonal closures, thereby reducing catch and release activity. Increased minimum size limits, conversely, directly affect the ability to reach the bag limit, inducing increased catch and release behavior. Thus, the net adverse economic impacts of **Alternative 5** are expected to be greater than those of **Preferred Alternative 3c**.

5.8.2 Action 2: Aggregate Bag Limit Alternatives

The expected impacts of this alternative are identical to those of **Action 1, Alternative 1** and are included herein by reference.

Alternative 2 is expected to reduce harvests by approximately 25,000-262,000 fish, valued at \$103,000-\$1.038 million in consumer surplus (Table 12), or approximately 16,000-246,000 more fish, valued at \$65,000-\$969,000 more than **Alternative 1** (Table 13). The combined effects of the more severe bag limit reduction and closure period result in the impacts of **Alternative 2d** being the most severe.

Assuming a seasonal closure is imposed, the impacts vary by sector. **Alternative 2c** would produce the least adverse impact for the charterboat sector, a \$111,000 reduction in consumer surplus if the 2005 fishery is like that of 2003, or a \$162,000 reduction in consumer surplus if the fishery is like that of 2004 (Table 16). For the private/rental sector, the respective impacts are \$136,000 under 2003 conditions and \$308,000 under 2004 conditions under **Alternative 2c** (Table 20).

The reduction in the aggregate bag limit on top of the reduction in the red grouper bag limit may provide some protection to other grouper species from redirected red grouper effort, as well as

reduce bycatch and subsequent mortality of red grouper, assuming anglers cease fishing upon reaching the limit. The economic impacts of this cannot be assessed since it cannot be forecast how much redirection might otherwise occur and what impact this may have on these species. The reduction in the aggregate bag limit should not eliminate the mitigation benefits of all substitution, but could prevent excessive new pressure on substitute species. Avoidance of excessive pressure on these alternative species and the additional management measures that might otherwise be required would eliminate any reduction of benefits that would accrue to these fisheries.

Preferred Alternative 3 is expected to reduce harvests by approximately 32,000-266,000 fish, valued at \$131,000-\$1.054 million in consumer surplus (Table 12), or approximately 22,000-250,000 more fish, valued at \$93,000-\$986,000 more than **Alternative 1** (Table 13). The combined effects of the more severe bag reduction and closure period result in the impacts of **Alternative 3d** being the most severe.

Assuming a seasonal closure is imposed, the impacts vary by sector. **Alternative 3c** would produce the least adverse impact for the charterboat sector, a reduction in value of \$30,000, if the 2005 fishery is like that of the 2003 fishery, or \$47,000, if the fishery is more like that of 2004 (Table 16). For the private/rental sector, **Alternative 3c** similarly produces the least adverse impacts, \$140,000 under 2003 conditions and \$341,000 under 2004 conditions (Table 20).

Similar to **Alternative 2**, the reduction in the aggregate bag limit under **Preferred Alternative 3** may provide protection to other grouper species from redirected red grouper effort, as well as reduce bycatch and subsequent mortality of red grouper, assuming anglers cease fishing upon reaching the bag. Since the reduction in the aggregate limit is greater for this alternative than **Alternative 2**, the potential protection is greater. However, the greater the reduction, the more anglers are limited in substituting other grouper species for reductions in red grouper harvests and the opportunity for mitigating the impacts of the reduced red grouper bag limit is reduced. Further, at some point, the protection of these other species may be greater than is necessary, given natural availability and ability or tendency to catch these species (a stock may be able to biologically support a 4-fish limit, yet be subjected to a 3-fish limit). Thus, foregone benefits may be incurred. The point at which this becomes the case, however, has not been determined.

Alternative 4 is expected to reduce harvests by approximately 54,000-272,000 fish, valued at \$223,000-\$1.079 million in consumer surplus (Table 12), or approximately 45,000-256,000 more fish, valued at \$184,000-\$1.011 million more than **Alternative 1** (Table 13). The combined effects of the more severe bag limit reduction and closure period result in the impacts of **Alternative 4d** being the most severe.

Assuming a seasonal closure is imposed, the impacts vary by sector. **Alternative 4c** would produce the least adverse impact for the charterboat sector, a \$153,000 reduction in consumer surplus if the 2005 fishery is like that of the 2003 fishery, or \$256,000 if the fishery is more like that of 2004 (Table 16). For the private/rental sector, the respective values are \$176,000 under 2003 conditions and \$390,000 under 2004 conditions (Table 20).

Similar to **Alternatives 2 and 3**, the reduction in the aggregate bag limit on top of the reduction in the red grouper bag limit may provide some protection to other grouper species from redirected red grouper effort, as well as reduced bycatch and subsequent mortality of red grouper, assuming anglers cease fishing upon reaching the limit. Since the reduction in the aggregate limit is greater for this alternative, the potential protection is greater. However, the greater the reduction, the more anglers are limited in substituting species and mitigating the impacts of the reduced red grouper bag limit. As discussed under **Alternative 3**, at some point the protection of these other species may be more than is necessary and the potential for foregone benefits exists.

5.9 Significant Economic Impact Criterion

The outcome of a significant economic impact can be ascertained by examining two issues: disproportionality and profitability.

Disproportionality: Do the regulations place a substantial number of small entities at a significant competitive disadvantage to large entities?

All the operations potentially affected by the rule are considered small entities so the issue of disproportionality does not arise in the present case.

Profitability: Do the regulations significantly reduce profit for a substantial number of small entities?

Other than reductions in consumer surplus associated with the fishing experience, the primary impacts of the interim rule would be the potential cancellation of fishing trips and reduction/elimination of expenditures to the fishing sector and related industries. While expenditures through the myriad of associated industries cannot be tracked, loss of for-hire fees is estimated to be as high as \$3.17 million, though the reduction associated with the **Preferred Alternative 3c** is only \$337,000 (2004 fishery conditions) to \$353,000 (2003 fishery conditions). Although not all for-hire vessels in Florida would be expected to be impacted and, in addition to Florida for-hire entities, some non-Florida entities also experience trip cancellation, if it is assumed that the total number of Florida vessels sufficiently captures the overestimate of affected Florida entities and underestimate of non-Florida entities, then applying the potential lost fees equates to approximately \$3,000 per vessel, or approximately 4 percent of annual revenues and 8 percent of annual profits for the charterboat sector. Similar analysis of the headboat sector is not possible since the estimate of trip cancellation applies only to the charterboat sector. Since the estimate of affected vessels is likely an overestimate, the actual impact per entity may be underestimated, though the loss of \$3.17 million in charter fees is expected to be a worst-case scenario and not likely to occur due to alternative fishing options remaining viable. Since the expected impacts under the **Preferred Alternative 3c** are about one tenth of the worse case scenario impacts, the impact per vessel would be proportionately smaller, though some individual entities would be expected more severely impacted than the average entity. It should also be noted that the impacts are expected to be less than those that would occur under more severe management restrictions that would likely be necessary if reduction in harvest overages is substantially delayed.

5.10 Public and Private Costs

NMFS administrative costs of document preparation, review and publication are estimated at \$50,000. Although the imposition of reduced bag limits and seasonal closures imposes another level of complexity on the enforcement burden, enforcement budgets are not allocated by fishery. All enforcement of the measures contained in this rule will be conducted as part of routine and customary enforcement procedures and no new budgets will be allocated. Thus, no enforcement costs specifically attributable to this action can be identified at this time.

5.11 Summary

This rule is expected to reduce expenditures to the recreational grouper fishery and associated industries by a maximum of \$11.87-\$11.93 million under the worst-case scenario of cancellation of all affected trips. Such a scenario, however, is not expected to occur since alternative fishing options will remain viable in most areas during the grouper closed season. Further, the impacts of the rule are expected to be less than the impacts that would occur under the more restrictive management that would be required as a result of continued harvest overages. The nature of the proposed actions are not novel and the rule will not meet the \$100 million threshold of E.O. 12866, nor are there expected to be any significant adverse effects on prices, employment or competition. The interim rule is, therefore, determined not to be significant under E.O. 12866.

6.0 FINDING OF NO SIGNIFICANT IMPACTS

The Council on Environmental Quality regulations implementing the National Environmental Policy Act and NOAA's Administrative Order (NAO) 216-6 require that decision makers take into account both context and intensity when evaluating the significance of impacts resulting from a major federal action (40 CFR 1508.27; NAO 216-6, Section 6.01(b)). Evaluating significance with respect to context requires consideration of the local, regional, national, and/or global impacts of the action. Intensity refers to the severity of the impact, and is to be evaluated using specific criteria outlined at 40 CFR 1508.27(b) and at NAO 216-6, Section 6.01(b). The key findings related to the significance of the impacts associated with a one red grouper bag limit, three grouper aggregate bag limit and November-December closed season for all groupers follow. The findings are organized under the intensity criteria and include a consideration of the context in which the impacts occur.

(1) Impacts may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial (40 CFR §1508.27(b)(1); NAO 216-6, Section 6.01(b)(1)). The benefits and impacts of the preferred alternatives are described in detail in Sections 4.0 and 5.0. Overall, the preferred alternatives would reduce the recreational red grouper harvest by 21.5 percent and the recreational harvest of other groupers by 17.8 percent.

The preferred alternatives are expected to have small positive benefits to the physical environment, because they would likely reduce fishing effort and the number of fishing gear interactions with physical habitat. The preferred alternatives are also expected to have positive

benefits on the biological/ecological environment by reducing the likelihood that recreational landings overages will occur in 2005. By reducing recreational harvest, the effect of maintaining ABC within or near levels specified by the rebuilding plan will have a positive benefit on the long-term productivity of the stock. The November-December closure and three grouper aggregate bag limit would reduce fishing pressure and fishing effort on gag and other groupers that co-occur with red grouper. Applying management measures to not only red grouper, but all groupers, would also have positive biological benefits by reducing bycatch and discard mortality. However, total benefits are not expected to be significant because the recreational harvest represents a minor component of overall red grouper landings (19 percent).

The preferred alternatives will result in negative economic effects. Losses in consumer surplus are estimated to range between \$235,000 and \$432,000 and the rule may cause some trips to be cancelled, thereby reducing or eliminating expenditures to the fishing sector and related industries. Loss of for-hire fees is estimated to be between \$337,000 and \$353,000. Expenditures to the recreational grouper fishery and associated industries are expected to be reduced by \$11.87-\$11.98 million under the worst-case scenario of cancellation of all affected trips. Such a scenario, however, is not expected to occur since alternative fishing options are viable if the grouper fishery is closed. Further, the impacts of the rule are expected to be less than the impacts that would occur under the more restrictive management that would be required as a result of continued harvest overages. Continued overages would delay the recovery of red grouper, requiring deviation from the rebuilding plan, more restrictive management measures, and delay in greater harvest allowances that would be possible as the stock is rebuilt.

(2) *The degree to which the proposed action affects public health or safety (40 CFR §1508.27(b)(2); NAO 216-6, Section 6.01(b)(2)).* Preferred alternatives could benefit public health and safety if they deter some anglers from taking fishing trips, thus decreasing boat traffic. Lower bag limits could improve public health and safety if some fishermen are deterred from traveling farther offshore to catch lower bag limits of fish. Recreational grouper closed seasons could also benefit public health and safety if anglers are deterred from fishing during fall and winter, when weather and sea conditions are typically worse. However, total benefits are not expected to be significant because grouper represent only a small component of overall fish harvested by recreational anglers in the Gulf of Mexico.

(3) *Unique characteristics of the geographic area, such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas (40 CFR §1508.27(b)(3); NAO 216-6, Section 6.01(b)(3)).* There would be no affect on park lands, prime farmlands, wetlands, or wild and scenic rivers because those resources are not in the EEZ. The area affected by the preferred alternatives includes areas that have been identified as EFH for several other managed species. Several HAPCs, marine sanctuaries, and marine reserves are found within the Gulf EEZ, where grouper are caught. In most of these areas, gears used to harvest grouper are prohibited.

An EFH consultation was conducted and concluded EFH would not be adversely affected by this action. The preferred alternatives do not significantly alter the gears used for harvesting grouper or the amount of interactions with habitat. The closures would have some minor benefits to EFH by reducing fishing effort and the amount of gear interactions with habitat.

(4) The degree to which the effects on the quality of the human environment are likely to be highly controversial (40 CFR §1508.27(b)(4); NAO 216-6, Section 6.01(b)(4)). The Council and NMFS have received many letters, e-mails, and phone calls from recreational anglers, charterboat captains, and headboat operators expressing opposition to recreational management restrictions under consideration. The greatest source of controversy pertains to 2004 landings data. Recreational anglers have questioned landings estimates and many believe landings estimates are too high considering Florida sustained four hurricanes in 2004.

However, the MRFSS program conducted a thorough review of landings and effort data. MRFSS 2004 red grouper catch and harvest estimates are considered sound and the best available. Several minor corrections were made to intercept data and these changes are reflected in the final 2004 MRFSS intercepts. Estimated harvest had relatively low proportional standard error suggesting precise, reliable estimates. The number of angler trips increased only slightly in 2004 (< 10 percent), indicating the substantial increase in landings was not due to fishing effort. Examination of catch records revealed that the percentage of trips harvesting red grouper and the average number of red grouper landed in 2004 were higher than previous years for waves 1-5, and similar in wave 6.

Another source of controversy is how landings are distributed between the commercial and recreational sectors. Secretarial Amendment 1 used historical landings from 1999-2001 to establish a 5.31 mp GW commercial quota and 1.25 mp GW recreational target catch level. This interim action does not consider changes to the distribution of landings by sector. The Council can consider changes to allocation through amendments to their fishery management plans.

A final source of controversy is consideration of closed seasons that would apply not only to red grouper, but all groupers. Recreational anglers, and especially charterboat captains and headboat operators, have expressed concern about establishing long closed seasons during summer and fall 2005. Closed seasons and closed areas are typically the least preferred management alternatives when considering reductions in harvest, and the recreational sector has indicated that large economic impacts will result if harvest is closed for all groupers. Section 5.0 of this EA summarizes the economic impacts of the preferred closed season alternative. The preferred alternative would close the months of November and December, which are typically the months with the lowest recreational red grouper landings.

Additionally, many anglers believe the closures should only apply to red grouper and not other groupers. However, red grouper are a part of multispecies fishery and co-occur with many other groupers, including gag. The November – December closure for all groupers would reduce bycatch and reduce the likelihood that gag and other groupers are not adversely affected by changes to red grouper regulations.

(5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks (40 CFR §1508.27(b)(5); NAO 216-6, Section 6.01(b)(5)). There are no highly uncertain, unique or unknown risks associated with the preferred alternatives. Not reducing the harvest of red grouper in 2005 could increase the risk that the recreational sector will continue to exceed its target catch level and delay stock rebuilding.

(6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration (40 CFR §1508.27(b)(6); NAO 216-6, Section 6.01(b)(6)). Size limits, bag limits and closed seasons are currently used by the Council to limit the harvest of a variety of reef fish and coastal migratory species and therefore this action would not set a precedent for future actions. Also, this interim action does not represent a decision in principle about a future consideration. The Council is currently developing a regulatory amendment that would potentially establish permanent regulations for the recreational and commercial grouper fishery. This regulatory amendment may contain alternatives similar to those proposed in this EA. However, the regulatory amendment would include a separate analysis of the environmental effects of the proposed action for Council consideration.

(7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small components (40 CFR §1508.27(b)(7); NAO 216-6, Section 6.01(b)(7)). Cumulative effects are described in detail in Section 4.7. The preferred alternatives will increase the negative economic effects incurred by implementation of Secretarial Amendment 1. Losses in consumer surplus and expenditures are estimated to occur for both preferred alternatives. However, the impacts of these preferred alternatives are expected to be less than the impacts that would occur in the future if harvest overages were allowed to continue. Continued overages could require more restrictive management measures, and delay increases in harvest as the stock rebuilds.

The effects of these preferred alternatives would likely continue into the future. The Council is currently developing a regulatory amendment for red grouper and other groupers. This regulatory amendment would establish similar management measures to reduce recreational red grouper harvest as those proposed herein. Therefore, the biological benefits of this action could be continued by the regulatory amendment.

The Council and NMFS have also recently approved or are developing amendments to the Reef Fish FMP, which could result in additional cumulative biological and economic effects. Industry has also proposed a buyback program for the commercial grouper fishery. These amendments and actions and their corresponding regulations have various objectives, including rebuilding overfished stocks, maintaining caps on effort, reducing fishing effort, and improving economic efficiency. These amendments and proposed actions, in conjunction with the preferred alternatives proposed herein, are intended to positively benefit the biological environment. Economic losses of these collective actions in the short-term are expected to be less than the cumulative benefits of rebuilding stocks and improving economic conditions and efficiency in the long-term. Overall the cumulative effects of the preferred alternatives when combined with other Gulf fishery actions are not expected to be significant because the recreational harvest of red grouper represents a minor component of total reef fish and grouper harvest.

(8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources (40 CFR

NEPA requires all federal actions such as the formulation of fishery management plans to be evaluated for potential environmental and human environment impacts, and for these impacts to be assessed and reported to the public. For this amendment, the NMFS conducted an Environmental Assessment, which is a concise statement that determines whether the proposed interim rule will have a significant impact on the environment.

To comply with E.O. 12866, NMFS prepares a Regulatory Impact Review (RIR) for all fishery regulatory actions that either implement a new fishery management plan or significantly amend an existing plan. RIRs provide a comprehensive analysis of the costs and benefits to society associated with proposed regulatory actions, the problems and policy objectives prompting the regulatory proposals, and the major alternatives that could be used to solve the problems. These analyses can be found in Section 5 of this interim rule.

Other major laws affecting federal fishery management decision-making are summarized below.

7.1 Administrative Procedures Act

All federal rulemaking is governed under the provisions of the Administrative Procedure Act (APA) (5 U.S.C. Subchapter II), which establishes a “notice and comment” procedure to enable public participation in the rulemaking process. An agency for good cause may waive the requirement to provide prior notice and opportunity for public comment if the notice and public procedure thereon are impracticable, unnecessary, or contrary to the public interest. The APA also establishes a 30-day waiting period from the time a final rule is published until it takes effect. This waiting period may be waived if an agency establishes good cause. The agency has determined that delaying action to reduce overfishing in the red grouper fishery of the Gulf of Mexico to provide further notice and an opportunity for public comment prior to implementation would increase the likelihood of a loss of long-term productivity from the fishery and increase the probable need for more severe restrictions in the future. Therefore the agency, for good cause, waives the requirement for prior notice and public comment because it is contrary to the public interest.

7.2 Coastal Zone Management Act

Section 307(c)(1) of the federal Coastal Zone Management Act (CZMA) of 1972, as amended, requires that federal activities that affect any land or water use or natural resource of a state’s coastal zone be conducted in a manner consistent, to the maximum extent practicable, with approved state coastal management programs. The requirements for such a consistency determination are set forth in regulations at 15 C.F.R. part 930, subpart C. NMFS has determined that this action is consistent with the Coastal Zone Management programs of the states of Alabama, Florida, Louisiana, Mississippi, and Texas to the maximum extent possible. This determination has been submitted to the responsible state agencies under Section 307 of the CZMA.

7.3 Data Quality Act

The Data Quality Act (DQA) (Public Law 106-443) effective October 1, 2002, requires the government to set standards for the quality of scientific information and statistics used and disseminated by federal agencies. Specifically, the Act directs the Office of Management and Budget (OMB) to issue government wide guidelines that “provide policy and procedural guidance to federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information disseminated by federal agencies.” Such guidelines have been issued, directing all federal agencies to create and disseminate agency-specific standards to: (1) ensure information quality and develop a pre-dissemination review process; (2) establish administrative mechanisms allowing affected persons to seek and obtain correction of information; and (3) report periodically to OMB on the number and nature of complaints received. Pursuant to Section 515 of Public Law 106-554, this information document has undergone a predissemination review by the Southeast Regional Office, Sustainable Fisheries Division and is available upon request.

7.4 Endangered Species Act

The Endangered Species Act (ESA) of 1973, as amended, (16 U.S.C. Section 1531 et seq.) requires that federal agencies use their authorities to conserve endangered and threatened species. The ESA requires NMFS, when proposing a fishery action that “may affect” critical habitat or endangered or threatened species, to consult with the appropriate administrative agency (itself for most marine species, the U.S. Fish and Wildlife Service for all remaining species) to determine the potential impacts of the proposed action. Consultations are concluded informally when proposed actions “may affect but are not likely to adversely affect” endangered or threatened species or designated critical habitat. Formal consultations, including a biological opinion, are required when proposed actions may affect and are “likely to adversely affect” endangered or threatened species or adversely modify designated critical habitat. If jeopardy or adverse modification is found, the consulting agency is required to suggest reasonable and prudent alternatives. A formal consultation for the Gulf of Mexico reef fish fishery was completed in 2005 and concluded mortalities of endangered and threatened species were uncommon from hook-and-line gear used in the reef fish fishery and were not likely to jeopardize the continued existence of threatened or endangered species. Based on reinitiation triggers in 50 CFR 402.16, there is no need to conduct another consultation for this action.

7.5 Executive Orders

7.5.1 E.O. 12630: Takings

The Executive Order on Government Actions and Interference with Constitutionally Protected Property Rights that became effective March 18, 1988, requires that each federal agency prepare a Takings Implication Assessment for any of its administrative, regulatory, and legislative policies and actions that affect, or may affect, the use of any real or personal property. Clearance of a regulatory action must include a takings statement and, if appropriate, a Takings Implication Assessment. There are no takings implications from the proposed action.

7.5.2 E.O. 12962: Recreational Fisheries

Signed on June 7, 1995, this Executive Order addresses recreational fishing in the United States. The order mandates that Federal agencies improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities by such activities as: Developing and encouraging partnerships between governments and the private sector to advance aquatic resource conservation and enhance recreational fishing opportunities, identifying recreational fishing opportunities that are limited by water quality and habitat degradation and promoting restoration to support viable, healthy, and, where feasible, self-sustaining recreational fisheries, fostering sound aquatic conservation and restoration endeavors to benefit recreational fisheries, supporting outreach programs designed to stimulate angler participation in the conservation and restoration of aquatic systems, and implementing laws under their purview in a manner that will conserve, restore, and enhance aquatic systems that support recreational fisheries.

In addition, this order establishes National Recreational Fisheries Coordination Council which will oversee the various Federal agencies' actions and programs to ensure that they accomplish the goals set forth in this order. More specifically, the Council will ensure that the social and economic values of healthy aquatic systems that support recreational fisheries are considered by Federal agencies in the course of their actions, reduce duplicative and cost-inefficient programs among Federal agencies involved in conserving or managing recreational fisheries, and share the latest resource information and management technologies to assist in the conservation and management of recreational fisheries.

Finally, within twelve months of the date of this order, the Coordination Council, in cooperation with Federal agencies, States, and Tribes, and after consulting with the Federally chartered Sport Fishing and Boating Partnership Council, shall develop a comprehensive Recreational Fishery Resources Conservation Plan. The plan will set forth a 5-year agenda for Federal agencies to help restore and conserve the recreational fisheries of the United States. Concerning the potential overlap of this order and the Endangered Species Act of 1973 (ESA), all Federal agencies are instructed to aggressively work to identify and minimize conflicts between recreational fisheries and their respective responsibilities under the ESA. Within six months of the date of this order, the Fish and Wildlife Service and the National Marine Fisheries Service will promote compatibility and reduce conflicts between the administration of the ESA and recreational fisheries by developing a joint agency policy that will: (1) ensure consistency in the administration of the ESA between and within the two agencies, (2) promote collaboration with other Federal, State, and Tribal fisheries managers, and (3) improve and increase efforts to inform nonfederal entities of the requirements of the ESA.

7.5.3 E.O. 13089: Coral Reef Protection

The Executive Order on Coral Reef Protection requires federal agencies whose actions may affect U.S. coral reef ecosystems to identify those actions, utilize their programs and authorities to protect and enhance the conditions of such ecosystems; and, to the extent permitted by law, ensure that actions that they authorize, fund or carry out do not degrade the condition of that ecosystem. There are no implications to coral reefs by the action proposed.

7.5.4 E.O. 13132: Federalism

The Executive Order on Federalism requires agencies in formulating and implementing policies, to be guided by the fundamental Federalism principles. The Order serves to guarantee the division of governmental responsibilities between the national government and the states. No Federalism issues have been identified relative to the proposed action. Therefore, consultation with state officials under this Executive Order is not necessary.

7.5.5 E.O. 13158: Marine Protected Areas

This Executive Order requires federal agencies to consider whether their proposed action(s) will affect any area of the marine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural or cultural resource within the protected area. This action would have no impacts to marine protected areas.

7.6 Marine Mammal Protection Act

The MMPA established a moratorium, with certain exceptions, on the taking of marine mammals in U.S. waters and by U.S. citizens on the high seas, and on the importing of marine mammals and marine mammal products into the United States. Under the MMPA, the Secretary of Commerce (authority delegated to NMFS) is responsible for the conservation and management of cetaceans and pinnipeds (other than walruses). The Secretary of the Interior is responsible for walruses, sea and marine otters, polar bears, manatees, and dugongs. Because marine mammals generally do not overlap geographically with the grouper fishery, this action should not effect marine mammal populations. The GOM hook-and-line reef fish fishery is listed as a Category III fishery as required by the MMPA, as there have been no documented interactions between this fishery and marine mammals (69 FR 231).

7.7 Paperwork Reduction Act

The Paperwork Reduction Act (PRA) of 1995 (44 U.S.C. 3501 et seq.) regulates the collection of public information by federal agencies to ensure that the public is not overburdened with information requests, that the federal government's information collection procedures are efficient, and that federal agencies adhere to appropriate rules governing the confidentiality of such information. The PRA requires NMFS to obtain approval from the Office of Management and Budget before requesting most types of fishery information from the public. The proposed action does not change the current requirements for collecting information.

7.8 Small Business Act

The Small Business Act of 1953, as amended, Section 8(a), 15 U.S.C. 634(b)(6), 636(j), 637(a) and (d); Public Laws 95-507 and 99-661, Section 1207; and Public Laws 100-656 and 101-37 are administered by the Small Business Administration. Because most businesses associated with

fishing are considered small businesses, NMFS, must make an assessment of how those regulations will affect small businesses. Implications to small businesses are discussed in Section 5.0, herein.

7.9 Essential Fish Habitat

The amended MSFCMA requires adverse effects to EFH caused by fishing be minimized to the extent practicable and identify other actions to encourage the conservation and enhancement of that EFH. This action will not have an adverse impact on EFH, as indicated in Section 4.0. The Gulf Council recently approved Generic Amendment 3 for Essential Fish Habitat, which analyzes actions to encourage the conservation and enhancement of EFH and identifies measures to minimize to the extent practicable any adverse effects of fishing on such EFH. An informal consultation was conducted for this action and concluded this action will not adversely effect EFH.

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10.0 LIST OF AGENCIES CONSULTED

The following agencies were consulted on the provisions of this environmental assessment:

Coastal Zone Management Programs

Alabama, Florida, Louisiana, Mississippi, and Texas

Other Agencies, Organizations, or Persons

Alabama Department of Conservation and Natural Resources, Marine Resources Division
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Louisiana Department of Wildlife and Fisheries
Mississippi Department of Marine Resources
National Marine Fisheries Service Southeast Regional Office
National Marine Fisheries Service Southeast Fisheries Science Center
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National Marine Fisheries Service Law Enforcement
Texas Parks and Wildlife Department
United States Fish and Wildlife Service
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11.0 TABLES

Table 1. Estimated percent reductions in 2005 harvest of red grouper for various bag limits

| Bag Limit | Estimated Reduction | | |
|-----------|---------------------|----------|-------|
| | MRFSS | Headboat | Total |
| 2 | 6.2 | 0.0 | 6.0 |
| 1 | 15.1 | 0.5 | 14.8 |

Table 2. Estimated percent reductions in 2005 harvest for various seasonal closures.

| Closed Season | Estimated Reduction | | |
|---------------|---------------------|---------------|-------------|
| | Red Grouper | Other Grouper | All Grouper |
| Nov-Dec | 8.3 | 17.8 | 14.3 |
| Oct-Dec | 15.6 | 26.6 | 22.8 |
| Sep-Dec | 22.8 | 35.2 | 30.7 |
| Aug-Nov | 34.9 | 34.4 | 34.9 |
| Jul-Dec | 55.2 | 51.3 | 52.7 |

Table 3. Estimated percent reductions in 2005 harvest for a one red grouper bag limit combined with various seasonal closures.

| Closed Season | Red Grouper limit | Estimated Reduction |
|---------------|-------------------|---------------------|
| Nov-Dec | 1 | 21.5 |
| Oct-Dec | 1 | 27.2 |
| Sep-Dec | 1 | 32.8 |
| Aug-Nov | 1 | 42.1 |

Table 4. Estimated percent reductions in 2005 harvest for a one red grouper bag limit and various aggregate grouper bag limits.

| Bag Limit | | Estimated Reduction | | |
|-------------|-----------|---------------------|---------------|-------------|
| Red Grouper | Aggregate | Red Grouper | Other Grouper | All Grouper |
| 1 | 4 | 14.8 | 1.8 | 6.5 |
| 1 | 3 | 14.8 | 5.2 | 8.9 |
| 1 | 2 | 14.8 | 12.0 | 13.5 |

Table 5. Estimated percent reductions in 2005 grouper harvest (all shallow- and deep-water grouper) for a one red grouper bag limit, various aggregate grouper bag limits, and seasonal closures.

| Closed Season | Red Grouper limit | Estimated Reduction | | |
|---------------|-------------------|---------------------|-------------|-------------|
| | | agg limit 4 | agg limit 3 | agg limit 2 |
| Nov-Dec | 1 | 19.4 | 21.1 | 24.5 |
| Oct-Dec | 1 | 26.8 | 28.1 | 30.8 |
| Sep-Dec | 1 | 34.0 | 35.0 | 37.0 |
| Aug-Nov | 1 | 37.5 | 38.3 | 39.9 |

Table 6. Recreational landings of gag and red grouper (lbs total weight), by mode, 1991-2004.

| Year | Gag | | | | Red Grouper | | | |
|------|---------|-----------|-----------|----------|-------------|-----------|---------|----------|
| | Shore | Private | Charter | Headboat | Shore | Private | Charter | Headboat |
| 1991 | 136,447 | 1,836,886 | 140,702 | 110,920 | 62,097 | 1,660,339 | 58,576 | 67,126 |
| 1992 | 44,738 | 1,190,687 | 493,566 | 121,540 | 153,105 | 2,536,645 | 360,229 | 69,191 |
| 1993 | 55,485 | 1,484,750 | 742,128 | 155,760 | 123,319 | 1,927,369 | 182,234 | 95,075 |
| 1994 | 10,190 | 1,372,734 | 563,736 | 159,300 | 13,691 | 1,788,394 | 235,555 | 73,307 |
| 1995 | 101,958 | 1,878,310 | 643,351 | 118,000 | 9,193 | 1,452,223 | 631,417 | 112,706 |
| 1996 | 17,383 | 1,462,454 | 539,045 | 101,480 | 0 | 646,448 | 186,935 | 108,820 |
| 1997 | 16,415 | 1,755,373 | 938,507 | 96,760 | 8,408 | 434,326 | 179,704 | 51,475 |
| 1998 | 140,545 | 2,078,697 | 1,567,519 | 237,180 | 4,839 | 562,958 | 175,812 | 58,926 |
| 1999 | 52,139 | 2,506,930 | 1,121,352 | 186,440 | 0 | 993,540 | 172,589 | 63,934 |
| 2000 | 78,360 | 3,487,102 | 1,174,368 | 199,992 | 0 | 1,492,441 | 732,368 | 70,161 |
| 2001 | 0 | 2,877,556 | 977,312 | 116,647 | 0 | 1,047,165 | 368,142 | 51,331 |
| 2002 | 16,920 | 3,028,208 | 736,098 | 79,845 | 0 | 1,432,454 | 311,726 | 40,544 |
| 2003 | 5,183 | 2,591,236 | 681,825 | 109,769 | 0 | 1,085,874 | 273,141 | 53,626 |
| 2004 | 29,614 | 3,612,264 | 994,447 | NA | 0 | 2,606,503 | 587,788 | NA |

Source: MRFSS, Headboat Survey, and Texas Parks and Wildlife Survey. Headboat landings for 2004 are not available.

Table 7. Socioeconomic characteristics of recreational anglers.

| | Charter | Private/Rental | Shore |
|---|----------------|-----------------------|--------------|
| Average Age | | | |
| Alabama | 42.17 | 42.49 | 47.59 |
| Florida East | 43.60 | 42.41 | 44.39 |
| Florida West | 43.85 | 44.03 | 44.18 |
| Louisiana | 44.99 | 44.35 | 41.39 |
| Mississippi | 43.70 | 41.51 | 41.74 |
| Average Income | | | |
| Alabama | 57,980 | 54,090 | 42,110 |
| Florida East | 94,590 | 56,250 | 44,100 |
| Florida West | 78,430 | 51,370 | 42,590 |
| Louisiana | 86,340 | 55,180 | 40,870 |
| Mississippi | 61,730 | 48,500 | 31,300 |
| Average Number of Fishing Trips | | | |
| Alabama | 3.64 | 31.99 | 34.92 |
| Florida East | 12.16 | 53.26 | 56.94 |
| Florida West | 10.83 | 47.07 | 50.56 |
| Louisiana | 11.73 | 30.50 | 31.78 |
| Mississippi | 15.09 | 43.34 | 69.63 |
| Average Years of Fishing Experience | | | |
| Alabama | 13.07 | 21.56 | 20.76 |
| Florida East | 18.37 | 22.20 | 21.18 |
| Florida West | 17.77 | 21.51 | 19.37 |
| Louisiana | 22.94 | 24.08 | 18.24 |
| Mississippi | 12.62 | 21.83 | 21.33 |
| Average Years of Fishing Experience in the State | | | |
| Alabama | 7.81 | 19.75 | 14.54 |
| Florida East | 10.61 | 18.07 | 15.04 |
| Florida West | 11.65 | 16.70 | 13.14 |
| Louisiana | 16.17 | 22.21 | 15.97 |
| Mississippi | 7.18 | 18.59 | 16.46 |
| Average Total Trip Expenditures | | | |
| Alabama | 479.17 | 53.55 | 150.25 |
| Florida East | 380.32 | 52.10 | 82.91 |
| Florida West | 622.29 | 127.44 | 98.88 |
| Louisiana | 326.26 | 39.35 | 57.56 |
| Mississippi | 296.91 | 27.04 | 28.27 |

Source: Holiman (2000).

Table 8. Economic characteristics of charterboats and headboats.

| Characteristic | Charterboats | Headboats |
|---|--------------|-----------|
| All Vessel Classes | | |
| Revenues (\$) | 76,960 | 404,172 |
| Costs (\$) | 40,200 | 65,962 |
| Profits (\$) | 36,758 | 338,209 |
| Ave. passenger | 5 | 30 |
| Max. passenger | 8 | 60 |
| Length (feet) | 37 | 65 |
| Horsepower | 493 | 786 |
| 6 or less maximum passenger capacity | | |
| Revenues | 70,491 | |
| Costs | 35,540 | |
| Profits | 34,949 | |
| Ave. passenger | 4 | |
| Length | 35 | |
| Horsepower | 475 | |
| 7 to 12 maximum passenger capacity | | |
| Revenues | 129,813 | |
| Costs | 43,311 | |
| Profits | 86,502 | |
| Ave. passenger | 6 | |
| Length | 41 | |
| Horsepower | 546 | |
| 13 to 30 maximum passenger capacity | | |
| Revenues | 113,266 | 298,812 |
| Costs | 73,887 | 35,750 |
| Profits | 39,379 | 263,062 |
| Ave. passenger | 9 | 17 |
| Length | 44 | 43 |
| Horsepower | 617 | 726 |
| 31 to 60 maximum passenger capacity | | |
| Revenues | 149,905 | 327,615 |
| Costs | 116,099 | 46,602 |
| Profits | 33,806 | 281,013 |
| Ave. passenger | 21 | 27 |
| Length | 60 | 64 |
| Horsepower | 750 | 735 |
| 61 or greater maximum passenger capacity | | |
| Revenues | | 570,376 |
| Costs | | 109,616 |
| Profits | | 460,760 |
| Ave. passenger | | 40 |
| Length | | 76 |
| Horsepower | | 903 |

Source of basic data: Databases from Holland et al. (1999) and Sutton et al. (1999).

Table 9. Economic characteristics of charterboats and headboats by geographical area.

| Characteristic | Charterboats | | Headboats | |
|---|--------------|--------------|-----------|--------------|
| | Florida | Rest of Gulf | Florida | Rest of Gulf |
| All Vessel Classes | | | | |
| Revenues (\$) | 68,233 | 106,118 | 318,512 | 630,046 |
| Costs (\$) | 37,984 | 62,624 | 69,410 | 87,621 |
| Profits (\$) | 30,249 | 43,494 | 249,103 | 542,425 |
| Ave. passenger | 4 | 8 | 25 | 41 |
| Max. passenger | 6 | 14 | 56 | 71 |
| Length (feet) | 35 | 41 | 60 | 74 |
| Horsepower | 465 | 615 | 795 | 732 |
| 6 or less maximum passenger capacity | | | | |
| Revenues | 68,620 | 69,748 | | |
| Costs | 37,962 | 34,417 | | |
| Profits | 30,656 | 35,330 | | |
| Ave. passenger | 4 | 4 | | |
| Length | 35 | 35 | | |
| Horsepower | 467 | 553 | | |
| 7 to 12 maximum passenger capacity | | | | |
| Revenues | 67,760 | 186,793 | | |
| Costs | 30,116 | 70,944 | | |
| Profits | 37,643 | 115,848 | | |
| Ave. passenger | 5 | 8 | | |
| Length | 31 | 48 | | |
| Horsepower | 303 | 706 | | |
| 13 to 30 maximum passenger capacity | | | | |
| Revenues | 55,124 | 141,134 | 352,515 | 84,000 |
| Costs | 43,407 | 94,458 | 30,296 | 57,568 |
| Profits | 11,716 | 46,676 | 322,219 | 26,432 |
| Ave. passenger | 6 | 11 | 18 | 10 |
| Length | 39 | 47 | 40 | 52 |
| Horsepower | 492 | 687 | 757 | 600 |
| 31 to 60 maximum passenger capacity | | | | |
| Revenues | | 176,629 | 227,996 | 556,080 |
| Costs | | 145,124 | 58,459 | 37,296 |
| Profits | | 31,505 | 169,535 | 518,784 |
| Ave. passenger | | 23 | 24 | 36 |
| Length | | 59 | 61 | 70 |
| Horsepower | | 738 | 704 | 875 |
| 61 or greater maximum passenger capacity | | | | |
| Revenues | | | 490,448 | 840,524 |
| Costs | | | 124,790 | 145,460 |
| Profits | | | 365,657 | 695,064 |
| Ave. passenger | | | 32 | 53 |
| Length | | | 73 | 83 |
| Horsepower | | | 1,083 | 624 |

Source: Holland et al. (1999) and Sutton et al. (1999).

| Table 10. Estimated impacts of Action 1. | | | | | | | | | |
|---|----------|-----------|-----------|-----------|-----------|-------------|-------------|-----------|-----------|
| | 2003 | | | | | | 2003/2004 | | |
| | Alt 1* | Alt 2 | Alt 3 | | | | Alt 4 | Alt 5 | |
| | | | 3a | 3b | 3c | 3d | | 5a | 5b |
| Trips affected by the red grouper bag limit | 483 | 7,075 | 7,075 | 7,075 | 7,075 | 7,075 | 483 | | |
| Trips affected by the aggregate bag limit | 453 | 453 | 453 | 453 | 453 | 453 | 453 | | |
| Trips affected by the closed season | 0 | 0 | 158,995 | 273,257 | 78,467 | 374,295 | 480,755 | | |
| Reduction in fish kept | 9,199 | 20,853 | 81,445 | 113,347 | 57,060 | 138,988 | 180,181 | 92,306 | 121,006 |
| Reduction in value | \$38,083 | \$86,331 | \$328,102 | \$449,286 | \$235,243 | \$546,211 | \$686,364 | \$292,086 | \$382,926 |
| | 2004 | | | | | | | | |
| | Alt 1 | Alt 2 | Alt 3 | | | | Alt 4 | | |
| | | | 3a | 3b | 3c | 3d | | | |
| Trips affected by the red grouper bag limit | 3,721 | 11,527 | 11,527 | 11,527 | 11,527 | 11,527 | 3,721 | | |
| Trips affected by the aggregate bag limit | 2,047 | 2,047 | 2,047 | 2,047 | 2,047 | 2,047 | 2,047 | | |
| Trips affected by the closed season | | | 146,171 | 165,129 | 79,842 | 291,664 | 438,116 | | |
| Reduction in fish kept | 16,570 | 42,655 | 158,773 | 173,916 | 104,349 | 259,073 | 312,333 | | |
| Reduction in value | \$68,600 | \$176,590 | \$621,154 | \$683,316 | \$432,003 | \$1,025,143 | \$1,234,703 | | |

*Alt 1 = Status Quo (2-fish red grouper bag limit, 5-fish aggregate bag limit, and no fixed closure)

Alt 2 = 1-fish red grouper bag limit

Alt 3a = 1-fish red grouper bag limit and a closure for all aggregate groupers for October-December

Alt 3b = 1-fish red grouper bag limit and a closure for all aggregate groupers for September-December

Alt 3c = 1-fish red grouper bag limit and a closure for all aggregate groupers for November-December

Alt 3d = 1-fish red grouper bag limit and a closure for all aggregate groupers for August-November

Alt 4 = a closure for all groupers for July-December

Alt 5a = 22-inch red grouper minimum size limit

Alt 5b = 23-inch red grouper minimum size limit.

| Table 11. Differences in estimated impacts from Alternative 1* (status quo), Action 1 . | | | | | | | | | |
|---|-----------|-----------|-----------|-----------|-----------|-------------|-----------|-----------|--|
| | 2003 | | | | | | | 2003/2004 | |
| | Alt 2 | Alt 3 | | | | Alt 4 | Alt 5 | | |
| | | 3a | 3b | 3c | 3d | | 5a | 5b | |
| Trips affected by the red grouper bag limit | 6,592 | 6,592 | 6,592 | 6,592 | 6,592 | 6,592 | | | |
| Trips affected by the aggregate bag limit | | | | | | | | | |
| Trips affected by the closed season | | 158,995 | 273,257 | 78,467 | 374,295 | 480,755 | | | |
| Reduction in fish kept | 11,654 | 72,247 | 104,148 | 47,861 | 129,789 | 170,982 | 79,421 | 108,121 | |
| Reduction in value | \$48,248 | \$290,019 | \$411,203 | \$197,160 | \$508,128 | \$648,281 | \$238,745 | \$329,585 | |
| | 2004 | | | | | | | | |
| | Alt 2 | Alt 3 | | | | Alt 4 | | | |
| | | 3a | 3b | 3c | 3d | | | | |
| Trips affected by the red grouper bag limit | 7,806 | 7,806 | 7,806 | 7,806 | 7,806 | 7,806 | | | |
| Trips affected by the aggregate bag limit | | | | | | | | | |
| Trips affected by the closed season | | 146,171 | 165,129 | 79,842 | 291,664 | 438,116 | | | |
| Reduction in fish kept | 26,085 | 142,203 | 157,346 | 87,779 | 242,503 | 295,763 | | | |
| Reduction in value | \$107,990 | \$552,555 | \$614,716 | \$363,404 | \$956,544 | \$1,166,103 | | | |

*Alt 1 = Status Quo (2-fish red grouper bag limit, 5-fish aggregate bag limit, and no fixed closure)

Alt 2 = 1-fish red grouper bag limit

Alt 3a = 1-fish red grouper bag limit and a closure for all aggregate groupers for October-December

Alt 3b = 1-fish red grouper bag limit and a closure for all aggregate groupers for September-December

Alt 3c = 1-fish red grouper bag limit and a closure for all aggregate groupers for November-December

Alt 3d = 1-fish red grouper bag limit and a closure for all aggregate groupers for August-November

Alt 4 = a closure for all groupers for July-December

Alt 5a = 22-inch red grouper minimum size limit

Alt 5b = 23-inch red grouper minimum size limit.

| Table 12. Estimated impacts of Action 2. | | | | | | | | | | | | | | | | |
|---|----------|-----------|-----------|-----------|-----------|-------------|-----------|-----------|-----------|-----------|-------------|-----------|-----------|-----------|-----------|-------------|
| 2003 | | | | | | | | | | | | | | | | |
| | Alt 1* | Alt 2 | | | | | Alt 3 | | | | | Alt 4 | | | | |
| | | 2 | 2a | 2b | 2c | 2d | 3 | 3a | 3b | 3c | 3d | 4 | 4a | 4b | 4c | 4d |
| Trips affected by the red grouper bag limit | 483 | 7,075 | 7,075 | 7,075 | 7,075 | 7,075 | 7,075 | 7,075 | 7,075 | 7,075 | 7,075 | 7,075 | 7,075 | 7,075 | 7,075 | 7,075 |
| Trips affected by the aggregate bag limit | 453 | 907 | 907 | 907 | 907 | 907 | 3,122 | 3,122 | 3,122 | 3,122 | 3,122 | 10,495 | 10,495 | 10,495 | 10,495 | 10,495 |
| Trips affected by the closed season | | | 158,995 | 273,257 | 78,467 | 374,295 | | 158,995 | 273,257 | 78,467 | 374,295 | | 158,995 | 273,257 | 78,467 | 374,295 |
| Reduction in fish kept | 9,199 | 24,780 | 84,190 | 115,004 | 59,804 | 139,891 | 31,679 | 87,599 | 116,961 | 64,203 | 141,096 | 53,752 | 98,941 | 123,884 | 79,503 | 145,235 |
| Reduction in value | \$38,083 | \$102,590 | \$339,465 | \$456,144 | \$246,606 | \$549,951 | \$131,152 | \$353,577 | \$464,249 | \$264,814 | \$554,939 | \$222,532 | \$400,534 | \$492,909 | \$328,156 | \$572,075 |
| 2004 | | | | | | | | | | | | | | | | |
| | Alt 1 | | Alt 2 | | | | | Alt 3 | | | | | Alt 4 | | | |
| | | 2 | 2a | 2b | 2c | 2d | 3 | 3a | 3b | 3c | 3d | 4 | 4a | 4b | 4c | 4d |
| Trips affected by the red grouper bag limit | 3,721 | 11,527 | 11,527 | 11,527 | 11,527 | 11,527 | 11,527 | 11,527 | 11,527 | 11,527 | 11,527 | 11,527 | 11,527 | 11,527 | 11,527 | 11,527 |
| Trips affected by the aggregate bag limit | 2,047 | 4,809 | 4,809 | 4,809 | 4,809 | 4,809 | 5,795 | 5,795 | 5,795 | 5,795 | 5,795 | 11,595 | 11,595 | 11,595 | 11,595 | 11,595 |
| Trips affected by the closed season | | | 146,171 | 165,129 | 79,842 | 291,664 | | 146,171 | 165,129 | 79,482 | 291,664 | | 146,171 | 165,129 | 79,842 | 291,664 |
| Reduction in fish kept | 16,570 | 54,158 | 165,200 | 179,490 | 113,482 | 262,191 | 73,061 | 175,650 | 188,523 | 129,286 | 266,172 | 104,900 | 195,267 | 204,105 | 156,043 | 272,173 |
| Reduction in value | \$68,600 | \$224,213 | \$647,761 | \$706,268 | \$469,815 | \$1,038,051 | \$302,471 | \$691,024 | \$743,788 | \$535,246 | \$1,054,536 | \$434,284 | \$772,239 | \$808,298 | \$646,019 | \$1,079,378 |

*Alt 1 = Status Quo (2-fish red grouper bag limit, 5-fish aggregate bag limit, and no fixed closure)

Alt 2 = 1-fish red grouper bag limit and 4-fish aggregate grouper bag limit

Alt 3 = 1-fish red grouper bag limit and 3-fish aggregate grouper bag limit

Alt 4 = 1-fish red grouper bag limit and 2-fish aggregate grouper bag limit

Variations:

a = closure for all groupers for October-December

b = closure for all groupers for September-December

c = closure for all groupers for November-December

d = closure for all groupers for August-November

| Table 13. Differences in estimated impacts from Alternative 1 (status quo), Action 2. | | | | | | | | | | | | | | | | |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|--|
| 2003 | | | | | | | | | | | | | | | | |
| | Alt 2 | | | | | Alt 3 | | | | | Alt 4 | | | | | |
| | 2 | 2a | 2b | 2c | 2d | 3 | 3a | 3b | 3c | 3d | 4 | 4a | 4b | 4c | 4d | |
| Trips affected by the red grouper bag limit | 6,592 | 6,592 | 6,592 | 6,592 | 6,592 | 6,592 | 6,592 | 6,592 | 6,592 | 6,592 | 6,592 | 6,592 | 6,592 | 6,592 | 6,592 | |
| Trips affected by the aggregate bag limit | 453 | 453 | 453 | 453 | 453 | 2,669 | 2,669 | 2,669 | 2,669 | 2,669 | 10,041 | 10,041 | 10,041 | 10,041 | 10,041 | |
| Trips affected by the closed season | | 158,995 | 273,257 | 78,467 | 374,295 | | 158,995 | 273,257 | 78,467 | 374,295 | | 158,995 | 273,257 | 78,467 | 374,295 | |
| Reduction in fish kept | 15,582 | 74,991 | 105,805 | 50,606 | 130,692 | 22,481 | 78,400 | 107,763 | 55,004 | 131,897 | 44,553 | 89,742 | 114,685 | 70,304 | 136,036 | |
| Reduction in value | \$64,508 | \$301,382 | \$418,061 | \$208,253 | \$511,868 | \$93,069 | \$315,494 | \$426,166 | \$226,732 | \$516,856 | \$184,449 | \$362,451 | \$454,826 | \$290,073 | \$533,992 | |
| 2004 | | | | | | | | | | | | | | | | |
| | Alt 2 | | | | | Alt 3 | | | | | Alt 4 | | | | | |
| | 2 | 2a | 2b | 2c | 2d | 3 | 3a | 3b | 3c | 3d | 4 | 4a | 4b | 4c | 4d | |
| Trips affected by the red grouper bag limit | 7,806 | 7,806 | 7,806 | 7,806 | 7,806 | 7,806 | 7,806 | 7,806 | 7,806 | 7,806 | 7,806 | 7,806 | 7,806 | 7,806 | 7,806 | |
| Trips affected by the aggregate bag limit | 2,042 | 2,042 | 2,042 | 2,042 | 2,042 | 3,747 | 3,747 | 3,747 | 3,747 | 3,747 | 9,547 | 9,547 | 9,547 | 9,547 | 9,547 | |
| Trips affected by the closed season | | 146,171 | 165,129 | 79,842 | 291,664 | | 146,171 | 165,129 | 79,842 | 291,664 | | 146,171 | 165,129 | 79,842 | 291,664 | |
| Reduction in fish kept | 37,588 | 148,630 | 162,890 | 96,912 | 245,621 | 56,491 | 159,080 | 171,953 | 112,716 | 249,603 | 88,330 | 178,697 | 187,535 | 139,473 | 255,603 | |
| Reduction in value | \$155,613 | \$579,161 | \$637,669 | \$401,215 | \$969,451 | \$233,872 | \$622,424 | \$675,189 | \$466,646 | \$985,936 | \$365,685 | \$703,640 | \$739,698 | \$577,419 | \$1,010,779 | |

*Alt 1 = Status Quo (2-fish red grouper bag limit, 5-fish aggregate bag limit, and no fixed closure)

Alt 2 = 1-fish red grouper bag limit and 4-fish aggregate grouper bag limit

Alt 3 = 1-fish red grouper bag limit and 3-fish aggregate grouper bag limit

Alt 4 = 1-fish red grouper bag limit and 2-fish aggregate grouper bag limit

Variations:

a = closure for all groupers for October-December

b = closure for all groupers for September-December

c = closure for all groupers for November-December

d = closure for all groupers for August-November

| Table 14. Estimated impacts of Action 1, charterboats (includes headboats for Alternative 5). | | | | | | | | | |
|---|----------|----------|-----------|-----------|-----------|-----------|-----------|----------|----------|
| | 2003 | | | | | | 2003/2004 | | |
| | Alt 1* | Alt 2 | Alt 3 | | | | Alt 4 | Alt 5 | |
| | | | 3a | 3b | 3c | 3d | | 5a | 5b |
| Trips affected by the red grouper bag limit | 483 | 1,629 | 1,629 | 1,629 | 1,629 | 1,629 | 483 | | |
| Trips affected by the aggregate bag limit | 453 | 453 | 453 | 453 | 453 | 453 | 453 | | |
| Trips affected by the closed season | | | 10,744 | 18,044 | 3,428 | 30,729 | 43,543 | | |
| Reduction in fish kept | 9,199 | 13,754 | 31,763 | 47,541 | 24,198 | 56,660 | 78,388 | 18,484 | 24,102 |
| Reduction in value | \$38,083 | \$56,943 | \$122,418 | \$185,640 | \$99,196 | \$214,169 | \$288,329 | \$54,380 | \$70,896 |
| | 2004 | | | | | | | | |
| | Alt 1 | Alt 2 | Alt 3 | | | | Alt 4 | | |
| | | | 3a | 3b | 3c | 3d | | | |
| Trips affected by the red grouper bag limit | 771 | 2,837 | 2,837 | 2,837 | 2,837 | 2,837 | 771 | | |
| Trips affected by the aggregate bag limit | 715 | 715 | 715 | 715 | 715 | 715 | 715 | | |
| Trips affected by the closed season | | | 7,892 | 11,138 | 3,271 | 19,595 | 35,507 | | |
| Reduction in fish kept | 6,148 | 14,738 | 62,858 | 78,001 | 36,367 | 94,413 | 122,601 | | |
| Reduction in value | \$25,452 | \$61,015 | \$247,017 | \$309,179 | \$150,558 | \$366,401 | \$472,163 | | |

*Alt 1 = Status Quo (2-fish red grouper bag limit, 5-fish aggregate bag limit, and no fixed closure)

Alt 2 = 1-fish red grouper bag limit

Alt 3a = 1-fish red grouper bag limit and a closure for all aggregate groupers for October-December

Alt 3b = 1-fish red grouper bag limit and a closure for all aggregate groupers for September-December

Alt 3c = 1-fish red grouper bag limit and a closure for all aggregate groupers for November-December

Alt 3d = 1-fish red grouper bag limit and a closure for all aggregate groupers for August-November

Alt 4 = a closure for all groupers for July-December

Alt 5a = 22-inch red grouper minimum size limit

Alt 5b = 23-inch red grouper minimum size limit.

| Table 15. Differences in estimated impacts from Alternative 1* (status quo), Action 1 , charterboats (includes headboats for Alternative 5). | | | | | | | | | |
|--|----------|-----------|-----------|-----------|-----------|-----------|----------|-----------|--|
| | 2003 | | | | | | | 2003/2004 | |
| | Alt 2 | Alt 3 | | | | Alt 4 | Alt 5 | | |
| | | 3a | 3b | 3c | 3d | | 5a | 5b | |
| Trips affected by the red grouper bag limit | 1,145 | 1,145 | 1,145 | 1,145 | 1,145 | | | | |
| Trips affected by the aggregate bag limit | | | | | | | | | |
| Trips affected by the closed season | | 10,744 | 18,044 | 3,428 | 30,729 | 43,543 | | | |
| Reduction in fish kept | 4,556 | 22,565 | 38,342 | 14,999 | 47,462 | 69,189 | 10,810 | 16,429 | |
| Reduction in value | \$18,860 | \$84,335 | \$147,557 | \$61,113 | \$176,086 | \$250,246 | \$22,612 | \$39,129 | |
| | 2004 | | | | | | | | |
| | Alt 2 | Alt 3 | | | | Alt 4 | | | |
| | | 3a | 3b | 3c | 3d | | | | |
| Trips affected by the red grouper bag limit | 2,066 | 2,066 | 2,066 | 2,066 | 2,066 | | | | |
| Trips affected by the aggregate bag limit | | | | | | | | | |
| Trips affected by the closed season | | 7,892 | 11,138 | 3,271 | 19,595 | 35,507 | | | |
| Reduction in fish kept | 8,590 | 56,710 | 71,853 | 30,219 | 88,265 | 116,454 | | | |
| Reduction in value | \$35,563 | \$221,565 | \$283,727 | \$125,106 | \$340,949 | \$446,712 | | | |

*Alt 1 = Status Quo (2-fish red grouper bag limit, 5-fish aggregate bag limit, and no fixed closure)

Alt 2 = 1-fish red grouper bag limit

Alt 3a = 1-fish red grouper bag limit and a closure for all aggregate groupers for October-December

Alt 3b = 1-fish red grouper bag limit and a closure for all aggregate groupers for September-December

Alt 3c = 1-fish red grouper bag limit and a closure for all aggregate groupers for November-December

Alt 3d = 1-fish red grouper bag limit and a closure for all aggregate groupers for August-November

Alt 4 = a closure for all groupers for July-December

Alt 5a = 22-inch red grouper minimum size limit

Alt 5b = 23-inch red grouper minimum size limit.

Table 16. Estimated impacts of Action 2, charterboats.

| 2003 | | | | | | | | | | | | | | | | |
|---|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | Alt 1* | Alt 2 | | | | | Alt 3 | | | | | Alt 4 | | | | |
| | | 2 | 2a | 2b | 2c | 2d | 3 | 3a | 3b | 3c | 3d | 4 | 4a | 4b | 4c | 4d |
| Trips affected by the red grouper bag limit | 483 | 1,629 | 1,629 | 1,629 | 1,629 | 1,629 | 1,629 | 1,629 | 1,629 | 1,629 | 1,629 | 1,629 | 1,629 | 1,629 | 1,629 | 1,629 |
| Trips affected by the aggregate bag limit | 453 | 907 | 907 | 907 | 907 | 907 | 1,178 | 1,178 | 1,178 | 1,178 | 1,178 | 2,022 | 2,022 | 2,022 | 2,022 | 2,022 |
| Trips affected by the closed season | | | 10,744 | 18,044 | 3,428 | 30,729 | | 10,744 | 18,044 | 3,428 | 30,729 | | 10,744 | 18,044 | 3,428 | 30,729 |
| Reduction in fish kept | 9,199 | 17,682 | 34,508 | 49,197 | 26,943 | 57,564 | 22,637 | 37,917 | 51,155 | 30,352 | 58,769 | 31,360 | 44,639 | 56,426 | 37,073 | 62,082 |
| Reduction in value | \$38,083 | \$73,203 | \$133,782 | \$192,498 | \$110,559 | \$217,910 | \$93,718 | \$147,894 | \$200,603 | \$124,672 | \$222,898 | \$129,832 | \$175,722 | \$222,424 | \$152,500 | \$236,614 |
| 2004 | | | | | | | | | | | | | | | | |
| | Alt 1 | | Alt 2 | | | | | Alt 3 | | | | | Alt 4 | | | |
| | | 2 | 2a | 2b | 2c | 2d | 3 | 3a | 3b | 3c | 3d | 4 | 4a | 4b | 4c | 4d |
| Trips affected by the red grouper bag limit | 771 | 2,837 | 2,837 | 2,837 | 2,837 | 2,837 | 2,837 | 2,837 | 2,837 | 2,837 | 2,837 | 2,837 | 2,837 | 2,837 | 2,837 | 2,837 |
| Trips affected by the aggregate bag limit | 715 | 1,219 | 1,219 | 1,219 | 1,219 | 1,219 | 2,116 | 2,116 | 2,116 | 2,116 | 2,116 | 3,429 | 3,429 | 3,429 | 3,429 | 3,429 |
| Trips affected by the closed season | | | 7,892 | 11,138 | 3,271 | 19,595 | | 7,892 | 11,138 | 3,271 | 19,595 | | 7,892 | 11,138 | 3,271 | 19,595 |
| Reduction in fish kept | 6,148 | 19,088 | 64,432 | 78,692 | 39,076 | 95,104 | 28,493 | 68,412 | 81,285 | 46,839 | 96,660 | 46,346 | 78,324 | 87,162 | 61,795 | 99,425 |
| Reduction in value | \$25,452 | \$79,026 | \$253,534 | \$312,041 | \$161,774 | \$369,264 | \$117,960 | \$270,010 | \$322,775 | \$193,912 | \$375,704 | \$191,870 | \$311,046 | \$347,105 | \$255,830 | \$387,154 |

*Alt 1 = Status Quo (2-fish red grouper bag limit, 5-fish aggregate bag limit, and no fixed closure)

Alt 2 = 1-fish red grouper bag limit and 4-fish aggregate grouper bag limit

Alt 3 = 1-fish red grouper bag limit and 3-fish aggregate grouper bag limit

Alt 4 = 1-fish red grouper bag limit and 2-fish aggregate grouper bag limit

Variations:

a = closure for all groupers for October-December

b = closure for all groupers for September-December

c = closure for all groupers for November-December

d = closure for all groupers for August-November

| Table 17. Differences in estimated impacts from Alternative 1 (status quo), Action 2, charterboats. | | | | | | | | | | | | | | | | |
|--|----------|-----------|-----------|-----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--|
| 2003 | | | | | | | | | | | | | | | | |
| | Alt 2 | | | | | Alt 3 | | | | | Alt 4 | | | | | |
| | 2 | 2a | 2b | 2c | 2d | 3 | 3a | 3b | 3c | 3d | 4 | 4a | 4b | 4c | 4d | |
| Trips affected by the red grouper bag limit | 1,145 | 1,145 | 1,145 | 1,145 | 1,145 | 1,145 | 1,145 | 1,145 | 1,145 | 1,145 | 1,145 | 1,145 | 1,145 | 1,145 | 1,145 | |
| Trips affected by the aggregate bag limit | 453 | 453 | 453 | 453 | 453 | 725 | 725 | 725 | 725 | 725 | 1,569 | 1,569 | 1,569 | 1,569 | 1,569 | |
| Trips affected by the closed season | | 10,744 | 18,044 | 3,428 | 30,729 | | 10,744 | 18,044 | 3,428 | 30,729 | | 10,744 | 18,044 | 3,428 | 30,729 | |
| Reduction in fish kept | 8,483 | 25,309 | 39,998 | 17,744 | 48,365 | 13,438 | 28,718 | 41,956 | 21,153 | 49,580 | 22,162 | 35,440 | 47,227 | 27,875 | 52,883 | |
| Reduction in value | \$35,120 | \$95,699 | \$154,415 | \$72,477 | \$179,827 | \$55,635 | \$109,811 | \$162,520 | \$86,589 | \$184,815 | \$91,749 | \$137,639 | \$184,341 | \$114,417 | \$198,531 | |
| 2004 | | | | | | | | | | | | | | | | |
| | Alt 2 | | | | | Alt 3 | | | | | Alt 4 | | | | | |
| | 2 | 2a | 2b | 2c | 2d | 3 | 3a | 3b | 3c | 3d | 4 | 4a | 4b | 4c | 4d | |
| Trips affected by the red grouper bag limit | 2,066 | 2,066 | 2,066 | 2,066 | 2,066 | 2,066 | 2,066 | 2,066 | 2,066 | 2,066 | 2,066 | 2,066 | 2,066 | 2,066 | 2,066 | |
| Trips affected by the aggregate bag limit | 504 | 504 | 504 | 504 | 504 | 1,401 | 1,401 | 1,401 | 1,401 | 1,401 | 2,714 | 2,714 | 2,714 | 2,714 | 2,714 | |
| Trips affected by the closed season | | 7,892 | 11,138 | 3,271 | 19,595 | | 7,892 | 11,138 | 3,271 | 19,595 | | 7,892 | 11,138 | 3,271 | 19,595 | |
| Reduction in fish kept | 12,941 | 58,285 | 72,544 | 32,928 | 88,956 | 22,345 | 62,264 | 75,137 | 40,691 | 90,512 | 40,198 | 72,177 | 81,014 | 55,647 | 93,278 | |
| Reduction in value | \$53,574 | \$228,082 | \$286,589 | \$136,322 | \$343,812 | \$92,508 | \$24,558 | \$297,323 | \$168,460 | \$350,252 | \$166,419 | \$285,594 | \$321,653 | \$230,378 | \$361,702 | |

*Alt 1 = Status Quo (2-fish red grouper bag limit, 5-fish aggregate bag limit, and no fixed closure)

Alt 2 = 1-fish red grouper bag limit and 4-fish aggregate grouper bag limit

Alt 3 = 1-fish red grouper bag limit and 3-fish aggregate grouper bag limit

Alt 4 = 1-fish red grouper bag limit and 2-fish aggregate group er bag limit

Variations:

a = closure for all groupers for October-December

b = closure for all groupers for September-December

c = closure for all groupers for November-December

d = closure for all groupers for August-November

| Table 18. Estimated impacts of Action 1, private boats. | | | | | | | | | | |
|---|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--|
| | 2003 | | | | | | | 2003/2004 | | |
| | Alt 1* | Alt 2 | Alt 3 | | | | Alt 4 | Alt 5 | | |
| | | | 3a | 3b | 3c | 3d | | 5a | 5b | |
| Trips affected by the red grouper bag limit | 0 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | | | | |
| Trips affected by the aggregate bag limit | | | | | | | | | | |
| Trips affected by the closed season | | | 148,250 | 255,213 | 75,039 | 343,566 | 437,212 | | | |
| Reduction in fish kept | | 7,099 | 49,682 | 65,807 | 32,861 | 82,327 | 101,793 | 73,822 | 96,904 | |
| Reduction in value | | \$29,388 | \$205,684 | \$263,646 | \$136,047 | \$332,041 | \$398,035 | \$237,706 | \$312,030 | |
| | 2004 | | | | | | | | | |
| | Alt 1 | Alt 2 | Alt 3 | | | | Alt 4 | | | |
| | | | 3a | 3b | 3c | 3d | | | | |
| Trips affected by the red grouper bag limit | 2,950 | 8,690 | 8,690 | 8,690 | 8,690 | 8,690 | 2,950 | | | |
| Trips affected by the aggregate bag limit | 1,333 | 1,333 | 1,333 | 1,333 | 1,333 | 1,333 | 1,333 | | | |
| Trips affected by the closed season | | | 138,279 | 153,991 | 76,571 | 272,069 | 402,609 | | | |
| Reduction in fish kept | 10,422 | 27,917 | 95,915 | 95,915 | 67,982 | 164,660 | 189,732 | | | |
| Reduction in value | \$43,148 | \$115,575 | \$374,137 | \$374,137 | \$281,445 | \$658,742 | \$762,539 | | | |

*Alt 1 = Status Quo (2-fish red grouper bag limit, 5-fish aggregate bag limit, and no fixed closure)

Alt 2 = 1-fish red grouper bag limit

Alt 3a = 1-fish red grouper bag limit and a closure for all aggregate groupers for October-December

Alt 3b = 1-fish red grouper bag limit and a closure for all aggregate groupers for September-December

Alt 3c = 1-fish red grouper bag limit and a closure for all aggregate groupers for November-December

Alt 3d = 1-fish red grouper bag limit and a closure for all aggregate groupers for August-November

Alt 4 = a closure for all groupers for July-December

Alt 5a = 22-inch red grouper minimum size limit

Alt 5b = 23-inch red grouper minimum size limit.

| Table 19. Differences in estimated impacts from Alternative 1* (status quo), Action 1 , private boats. | | | | | | | | | |
|---|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--|
| | 2003 | | | | | | | 2003/2004 | |
| | Alt 2 | Alt 3 | | | | Alt 4 | Alt 5 | | |
| | | 3a | 3b | 3c | 3d | | 5a | 5b | |
| Trips affected by the red grouper bag limit | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | | | | |
| Trips affected by the aggregate bag limit | | | | | | | | | |
| Trips affected by the closed season | | 148,250 | 255,213 | 75,039 | 343,566 | 437,212 | | | |
| Reduction in fish kept | 7,099 | 49,682 | 65,807 | 32,861 | 82,327 | 101,793 | 68,611 | 91,693 | |
| Reduction in value | \$29,388 | \$205,684 | \$263,645 | \$136,047 | \$332,041 | \$398,035 | \$216,132 | \$290,456 | |
| | 2004 | | | | | | | | |
| | Alt 2 | Alt 3 | | | | Alt 4 | | | |
| | | 3a | 3b | 3c | 3d | | | | |
| Trips affected by the red grouper bag limit | 5,740 | 5,740 | 5,740 | 5,740 | 5,740 | | | | |
| Trips affected by the aggregate bag limit | | | | | | | | | |
| Trips affected by the closed season | | 138,279 | 153,991 | 76,571 | 272,069 | 402,609 | | | |
| Reduction in fish kept | 17,495 | 85,493 | 85,493 | 57,560 | 154,238 | 179,310 | | | |
| Reduction in value | \$72,427 | \$330,990 | \$330,993 | \$238,297 | \$615,594 | \$719,391 | | | |

*Alt 1 = Status Quo (2-fish red grouper bag limit, 5-fish aggregate bag limit, and no fixed closure)

Alt 2 = 1-fish red grouper bag limit

Alt 3a = 1-fish red grouper bag limit and a closure for all aggregate groupers for October-December

Alt 3b = 1-fish red grouper bag limit and a closure for all aggregate groupers for September-December

Alt 3c = 1-fish red grouper bag limit and a closure for all aggregate groupers for November-December

Alt 3d = 1-fish red grouper bag limit and a closure for all aggregate groupers for August-November

Alt 4 = a closure for all groupers for July-December

Alt 5a = 22-inch red grouper minimum size limit

Alt 5b = 23-inch red grouper minimum size limit.

| Table 20. Estimated impacts of Action 2, private boats. | | | | | | | | | | | | | | | | |
|---|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 2003 | | | | | | | | | | | | | | | | |
| | Alt 1* | Alt 2 | | | | | Alt 3 | | | | | Alt 4 | | | | |
| | | 2 | 2a | 2b | 2c | 2d | 3 | 3a | 3b | 3c | 3d | 4 | 4a | 4b | 4c | 4d |
| Trips affected by the red grouper bag limit | | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 |
| Trips affected by the aggregate bag limit | | | | | | | 1,944 | 1,944 | 1,944 | 1,944 | 1,944 | 8,472 | 8,472 | 8,472 | 8,472 | 8,472 |
| Trips affected by the closed season | | | 148,250 | 255,213 | 75,039 | 343,566 | | 148,250 | 255,213 | 75,039 | 343,566 | | 148,250 | 255,213 | 75,039 | 343,566 |
| Reduction in fish kept | | 7,099 | 49,682 | 65,807 | 32,861 | 82,327 | 9,042 | 49,682 | 65,807 | 33,851 | 82,327 | 22,391 | 54,302 | 67,459 | 42,429 | 83,153 |
| Reduction in value | | \$29,388 | \$205,684 | \$263,645 | \$136,047 | \$332,041 | \$37,434 | \$205,684 | \$263,645 | \$140,143 | \$332,041 | \$92,700 | \$224,812 | \$270,485 | \$175,657 | \$335,461 |
| 2004 | | | | | | | | | | | | | | | | |
| | Alt 1 | Alt 2 | | | | | Alt 3 | | | | | Alt 4 | | | | |
| | | 2 | 2a | 2b | 2c | 2d | 3 | 3a | 3b | 3c | 3d | 4 | 4a | 4b | 4c | 4d |
| Trips affected by the red grouper bag limit | 2,950 | 8,690 | 8,690 | 8,690 | 8,690 | 8,690 | 8,690 | 8,690 | 8,690 | 8,690 | 8,690 | 8,690 | 8,690 | 8,690 | 8,690 | 8,690 |
| Trips affected by the aggregate bag limit | 1,333 | 2,870 | 2,870 | 2,870 | 2,870 | 2,870 | 3,679 | 3,679 | 3,679 | 3,679 | 3,679 | 8,166 | 8,166 | 8,166 | 8,166 | 8,166 |
| Trips affected by the closed season | | | 138,279 | 153,991 | 76,571 | 272,069 | | 138,279 | 153,991 | 76,571 | 272,069 | | 138,279 | 153,991 | 76,571 | 272,069 |
| Reduction in fish kept | 10,422 | 35,069 | 100,768 | 100,768 | 74,406 | 167,086 | 44,568 | 107,238 | 107,238 | 82,448 | 169,513 | 58,554 | 116,943 | 116,943 | 94,248 | 172,748 |
| Reduction in value | \$43,148 | \$145,187 | \$394,227 | \$394,227 | \$308,041 | \$668,787 | \$184,512 | \$421,013 | \$421,013 | \$341,334 | \$678,832 | \$242,414 | \$461,193 | \$461,193 | \$390,189 | \$692,225 |

*Alt 1 = Status Quo (2-fish red grouper bag limit, 5-fish aggregate bag limit, and no fixed closure)

Alt 2 = 1-fish red grouper bag limit and 4-fish aggregate grouper bag limit

Alt 3 = 1-fish red grouper bag limit and 3-fish aggregate grouper bag limit

Alt 4 = 1-fish red grouper bag limit and 2-fish aggregate grouper bag limit

Variations:

a = closure for all groupers for October-December

b = closure for all groupers for September-December

c = closure for all groupers for November-December

d = closure for all groupers for August-November

| Table 21. Differences in estimated impacts from Alternative 1 (status quo), Action 2, private boats. | | | | | | | | | | | | | | | | |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--|
| 2003 | | | | | | | | | | | | | | | | |
| | Alt 2 | | | | | Alt 3 | | | | | Alt 4 | | | | | |
| | 2 | 2a | 2b | 2c | 2d | 3 | 3a | 3b | 3c | 3d | 4 | 4a | 4b | 4c | 4d | |
| Trips affected by the red grouper bag limit | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | |
| Trips affected by the aggregate bag limit | | | | | | 1,944 | 1,944 | 1,944 | 1,944 | 1,944 | 8,472 | 8,472 | 8,472 | 8,472 | 8,472 | |
| Trips affected by the closed season | | 148,250 | 255,213 | 75,039 | 343,566 | | 148,250 | 255,213 | 75,039 | 343,566 | | 148,250 | 255,213 | 75,039 | 343,566 | |
| Reduction in fish kept | 7,099 | 49,682 | 65,807 | 32,861 | 82,327 | 9,042 | 49,682 | 65,807 | 33,851 | 82,327 | 22,391 | 54,302 | 67,459 | 42,429 | 83,153 | |
| Reduction in value | \$29,388 | \$205,684 | \$263,645 | \$136,047 | \$332,041 | \$37,434 | \$205,684 | \$263,645 | \$140,143 | \$332,041 | \$92,700 | \$224,812 | \$270,485 | \$175,657 | \$335,461 | |
| 2004 | | | | | | | | | | | | | | | | |
| | Alt 2 | | | | | Alt 3 | | | | | Alt 4 | | | | | |
| | 2 | 2a | 2b | 2c | 2d | 3 | 3a | 3b | 3c | 3d | 4 | 4a | 4b | 4c | 4d | |
| Trips affected by the red grouper bag limit | 5,740 | 5,740 | 5,740 | 5,740 | 5,740 | 5,740 | 5,740 | 5,740 | 5,740 | 5,740 | 5,740 | 5,740 | 5,740 | 5,740 | 5,740 | |
| Trips affected by the aggregate bag limit | 1,537 | 1,537 | 1,537 | 1,537 | 1,537 | 2,346 | 2,346 | 2,346 | 2,346 | 2,346 | 6,833 | 6,833 | 6,833 | 6,833 | 6,833 | |
| Trips affected by the closed season | | 138,279 | 153,991 | 76,571 | 272,069 | | 138,279 | 153,991 | 76,571 | 272,069 | | 138,279 | 153,991 | 76,571 | 272,069 | |
| Reduction in fish kept | 24,647 | 90,345 | 90,345 | 63,984 | 156,664 | 34,146 | 96,815 | 96,815 | 72,026 | 159,090 | 48,132 | 106,521 | 106,521 | 83,826 | 162,326 | |
| Reduction in value | \$102,039 | \$351,079 | \$351,079 | \$264,893 | \$625,639 | \$141,364 | \$377,866 | \$377,866 | \$298,186 | \$635,984 | \$199,266 | \$418,045 | \$418,045 | \$347,041 | \$649,077 | |

*Alt 1 = Status Quo (2-fish red grouper bag limit, 5-fish aggregate bag limit, and no fixed closure)

Alt 2 = 1-fish red grouper bag limit and 4-fish aggregate grouper bag limit

Alt 3 = 1-fish red grouper bag limit and 3-fish aggregate grouper bag limit

Alt 4 = 1-fish red grouper bag limit and 2-fish aggregate grouper bag limit

Variations:

a = closure for all groupers for October-December

b = closure for all groupers for September-December

c = closure for all groupers for November-December

d = closure for all groupers for August-November

| Table 22. Estimated potential foregone expenditures (millions) due to trip cancellation during seasonal closures, Action 1. | | | | | |
|--|---------|---------|---------|---------|---------|
| | 2003 | | | | |
| | Alt 3* | | | | Alt 4 |
| | 3a | 3b | 3c | 3d | |
| Private/rental trips | \$18.83 | \$32.41 | \$9.53 | \$43.63 | \$55.53 |
| Charterboat trips | \$7.33 | \$12.31 | \$2.34 | \$20.96 | \$29.70 |
| Total | \$26.16 | \$44.72 | \$11.87 | \$64.59 | \$85.23 |
| | 2004 | | | | |
| | Alt 3 | | | | Alt 4 |
| | 3a | 3b | 3c | 3d | |
| Private/rental trips | \$17.56 | \$19.56 | \$9.75 | \$34.55 | \$51.13 |
| Charterboat trips | \$5.38 | \$7.60 | \$2.23 | \$13.36 | \$24.22 |
| Total | \$22.94 | \$27.16 | \$11.98 | \$47.91 | \$75.35 |
| | Average | | | | |
| | Alt 3 | | | | Alt 4 |
| | 3a | 3b | 3c | 3d | |
| Private/rental trips | \$18.20 | \$25.99 | \$9.64 | \$39.09 | \$53.33 |
| Charterboat trips | \$6.36 | \$9.96 | \$2.29 | \$17.16 | \$26.96 |
| Total | \$24.55 | \$35.94 | \$11.93 | \$56.25 | \$80.29 |

*Alt 3a = 1-fish red grouper bag limit and a closure for all aggregate groupers for October-December
 Alt 3b = 1-fish red grouper bag limit and a closure for all aggregate groupers for September-December
 Alt 3c = 1-fish red grouper bag limit and a closure for all aggregate groupers for November-December
 Alt 3d = 1-fish red grouper bag limit and a closure for all aggregate groupers for August-November
 Alt 4 = a closure for all groupers for July-December

Table 23. Value of Unit increase in Catch and Keep of Snapper-Grouper by State*

| State | \$1997 | \$2004** |
|--------------|--------|----------|
| Alabama | 0.23 | 0.27 |
| Louisiana | 1.04 | 1.22 |
| Mississippi | 0.35 | 0.41 |
| West Florida | 3.52 | 4.14 |

Source: Haab, Whitehead, and McConnell. (2001, Table 5-8).

*The values are for snapper-grouper species that were kept by private boat anglers who targeted species in the snapper-grouper complex.

**Adjusted to \$2004 with the factor 1.18 (188.9/160.5) based on the 1997 (160.5) and 2004 (188.9) values of the U.S. CPI (BLS Series CUUR0000SA0, U.S. Consumer Price Index-All Urban Consumers, All items, 1982-84=100).

Appendix A. Species in the Gulf of Mexico Aggregate Grouper Bag

| Common Name | MRFSS Code |
|---------------------|------------|
| gag | 8835020501 |
| red grouper | 8835020408 |
| black grouper | 8835020502 |
| yellowfin grouper | 8835020506 |
| scamp | 8835020505 |
| yellowmouth grouper | 8835020504 |
| rock hind | 8835020406 |
| red hind | 8835020406 |
| yellowedge grouper | 8835020405 |
| misty grouper | 8835020409 |
| snowy grouper | 8835020411 |
| warsaw grouper | 8835020410 |
| speckled hind | 8835020404 |

Appendix B. Species in the Gulf of Mexico Snapper Grouper Complex

| Common Name | MRFSS Code |
|---------------------|------------|
| sand perch | 8835021002 |
| dwarf sand perch | 8835021005 |
| goliath grouper | 8835020401 |
| rock hind | 8835020402 |
| speckled hind | 8835020404 |
| yellowedge grouper | 8835020405 |
| red hind | 8835020406 |
| red grouper | 8835020408 |
| misty grouper | 8835020409 |
| warsaw grouper | 8835020410 |
| snowy grouper | 8835020411 |
| Nassau grouper | 8835020412 |
| gag | 8835020501 |
| black grouper | 8835020502 |
| yellowmouth grouper | 8835020504 |
| scamp | 8835020505 |
| yellowfin grouper | 8835020506 |
| blackline tilefish | 8835220102 |
| tilefish | 8835220201 |
| greater amberjack | 8835280101 |
| lesser amberjack | 8835280102 |
| banded rudderfish | 8835280104 |
| queen snapper | 8835360301 |
| cupera snapper | 8835360101 |
| gray snapper | 8835360102 |
| mutton snapper | 8835360103 |
| schoolmaster | 8835360104 |
| blackfin snapper | 8835360106 |
| red snapper | 8835360107 |
| dog snapper | 8835360109 |
| mohogany snapper | 8835360110 |
| lane snapper | 8835360112 |
| silk snapper | 8835360113 |
| yellowtail snapper | 8835360401 |
| wenchman | 8835360701 |
| vermilion snapper | 8835360501 |
| hogfish | 8839010901 |
| gray triggerfish | 8860020202 |
| queen triggerfish | 8860020201 |
| almaco jack | 8835280803 |
| goldface tilefish | 8835220105 |
| anchor tilefish | 8835220103 |

12.0 FIGURES

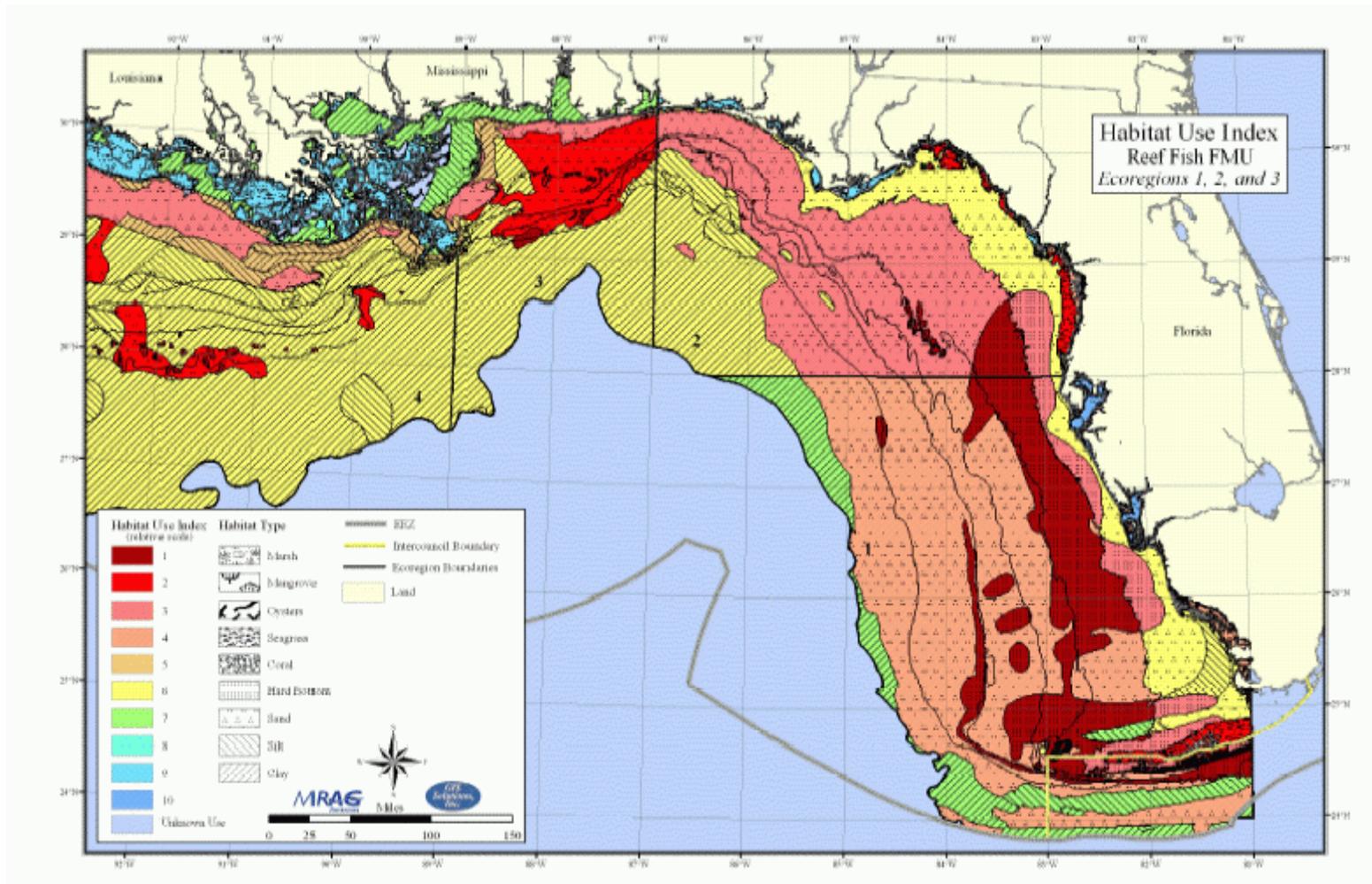


Figure 1. Habitat use by Reef Fish FMP species in the eastern Gulf of Mexico - low index number represent high levels of habitat use (from GMFMC 2004a).

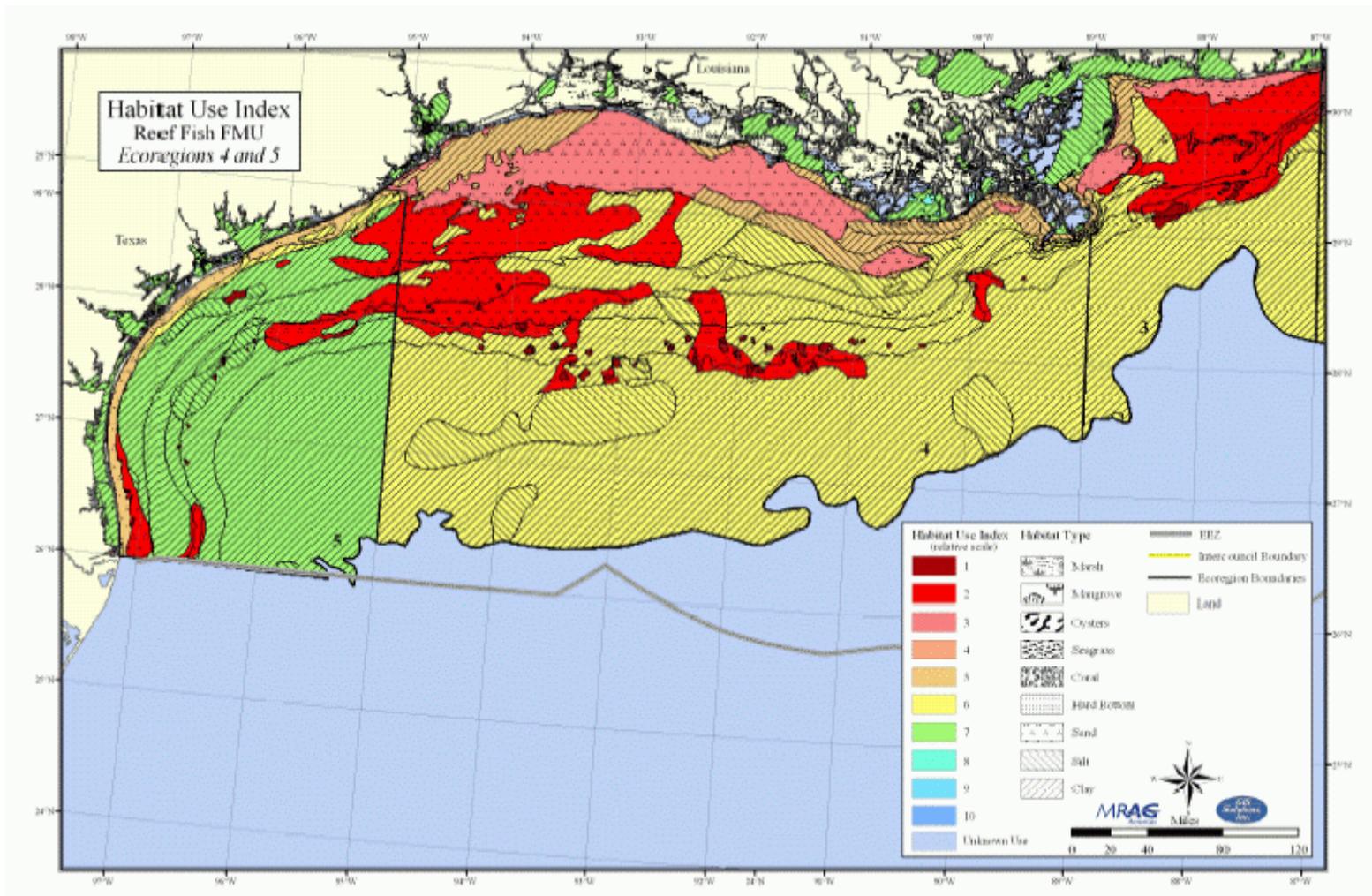


Figure 2. Habitat use by Reef Fish FMP species in the western Gulf of Mexico - low index number represent high levels of habitat use (from GMFMC 2004a).